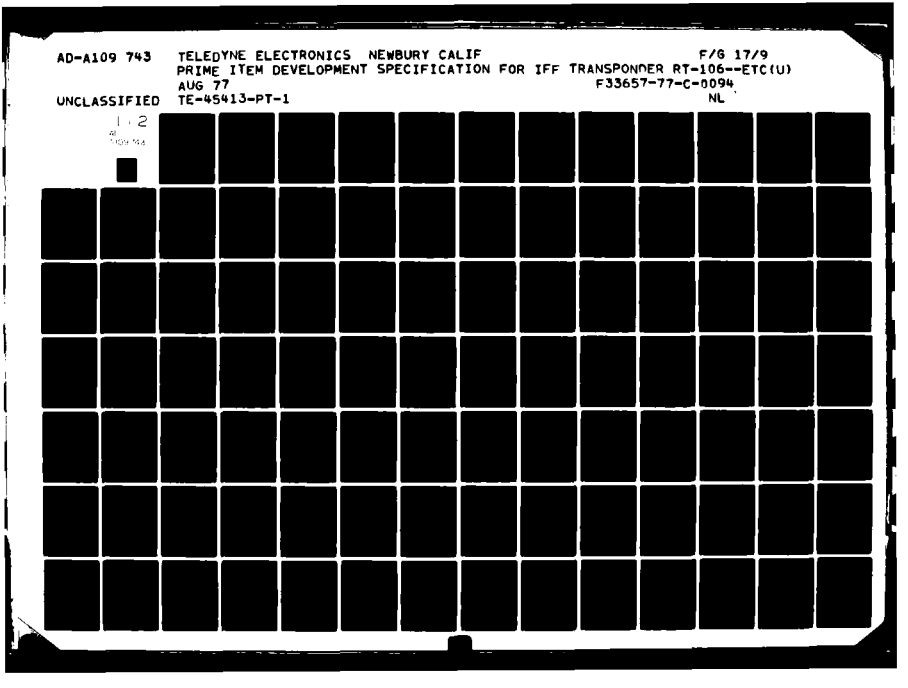

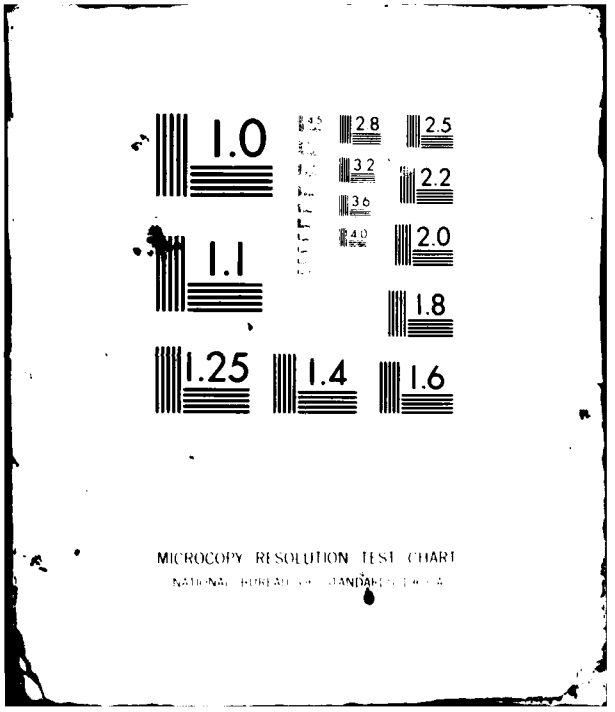
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MICROCOPY RESOLUTION TEST CHART

TELEDYNE ELECTRONICS

DOCUMENT NO. AECA 77-1
DATE March 31, 1977
REVISION A (August 18, 1977)
PAGE 1 OF 62
Code Ident 45413-

LEVEL II

AD A109743

PART 1 OF TWO PARTS

PRIME ITEM DEVELOPMENT SPECIFICATION

FOR

IFF TRANSPONDER

RT-1063B/APX101(V)

CI 650100A

F33657-77-C-0094

DTIC FILE COPY

AUTHENTICATED BY:

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DATE 9/11/77

INDEX OF ACTIVE SHEETS

FOREWORD

This specification shall be used when it is specified in the contract.

This specification supersedes the following documents:

McDonnell Douglas Document Spec. No. CP76301A328A605A Part I dated 15 Dec 1969 as revised thru SCN 0015 dated 6 Jan 1975	Prime Item Development Specification for IFF Transponder CI 650100A
Government Document Exhibit YFEA-1 Rev. A 21 May 1976	Additions/Exceptions to Prime Item Development (Part I)/ Product Fabrication (Part II) Specification for IFF Transponder CP76301A328A605A

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LIST OF FIGURES

LIST OF TABLES

1. SCOPE.

This specification establishes the performance, design, development and test requirements for Receiver-Transmitter Radio RT-1063B/APX-101(V).

2. APPLICABLE DOCUMENTS.

The revisions or issues shown below of documents listed hereunder form a part of this specification to the extent invoked by specific reference in paragraphs of this specification. In the event of conflict between the documents referenced in 2.1 hereunder and the contents of this specification the contents of this specification shall be considered a superseding requirement.

2.1 Government documents.

SPECIFICATIONS

Military

MIL-E-5400K 24 May 1968	Electronic Equipment, Airborne, General Specification for
MIL-N-7513E	Nomenclature Assignment, Contractors Method for Obtaining
MIL-I-8700 27 August 1954	Installation and Test of Electronic Equipment in Aircraft
MIL-M-7793C-2 (Supp. 1) 30 June 1967	Meter, Time Totalizing
MIL-A-25730B	Antenna Systems for Airborne Identification and Navigation Equipments, 950-1220 MC, General Specification for
MIL-C-27889D	Computer, Transducer Altitude, Altitude Encoding, General Specification for

DOD AIMS

DOD AIMS 65-1000 1 June 1965	Performance/Design and Qualification Requirements, Technical Standard for the ATCRBS/IFF/Mark XII System
DOD AIMS 64-302 27 November 1964	Control, Transponder Set C-6280(P)/APX

2.1 (Continued)

STANDARDS

Military

MIL-STD-143A 14 May 1963	Specifications and Standards, Order of Precedence and Selection of
MIL-STD-461A Notice 1 7 February 1968 Notice 2 20 March 1969 Notice 3 1 May 1970	Electromagnetic Interference Characteristics Requirements for Equipment
MIL-STD-462 Notice 1 1 August 1968	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-704A Notice 1 7 February 1968	Electric Power, Aircraft, Characteristics and Utilization of
MIL-STD-781B 15 November 1967	Reliability Test Exponential Distribution
MIL-STD-810B 15 June 1967	Environmental Test Methods
MIL-STD-882	Systems Safety Programs for Systems and Associated Subsystems and Equipment Required for.

Teledyne Electronics Drawing

137755	Receiver-Transmitter Radio, RT-1063B/APX-101(V) Outline and Installation.

3. REQUIREMENTS

The equipment specified herein shall be designed in accordance with the requirements of MIL-E-5400 and this specification, including requirements covering all operating, non-operating, and storage conditions.

3.1 Item definition. This equipment receives coded interrogations, decodes these interrogations and, in response, transmits pulse coded replies. Other items that are not part of this specification, but are essential to the operation of the IFF Transponder are a control panel and two antennas. The control panel may be either Control, Transponder Set C-6280( ) (P)/APX in accordance with DOD AIMS Specification 64-302, or Control Panel C-9012/APX, Control Panel Main Communications C-9015/ARA and associated BIT control panel used in the F-15. The two antennas shall be L-Band type such as described in MIL-A-25730, or equal.

3.1.1 Item diagram. Figure 1 is a functional diagram of the IFF Transponder unit. The transponder unit will consist of the following functional modules:

a. Receiver/Preselector #1
b. Receiver/Preselector #2
c. Transmitter
d. BIT assembly
e. Power Supply
f. Video Processor
g. Coupler-Diplexer
h. Coder
i. Decoder
j. Internal control

3.1.2 Interface definition.

3.1.2.1 Functional interface. The IFF Transponder unit shall provide the following functional outputs when interfaced as shown in Figure 2A or 2B and Table I. Selection of the functional interfaces of Figure 2A or 2B shall be determined by the wiring and controls external to the Transponder.

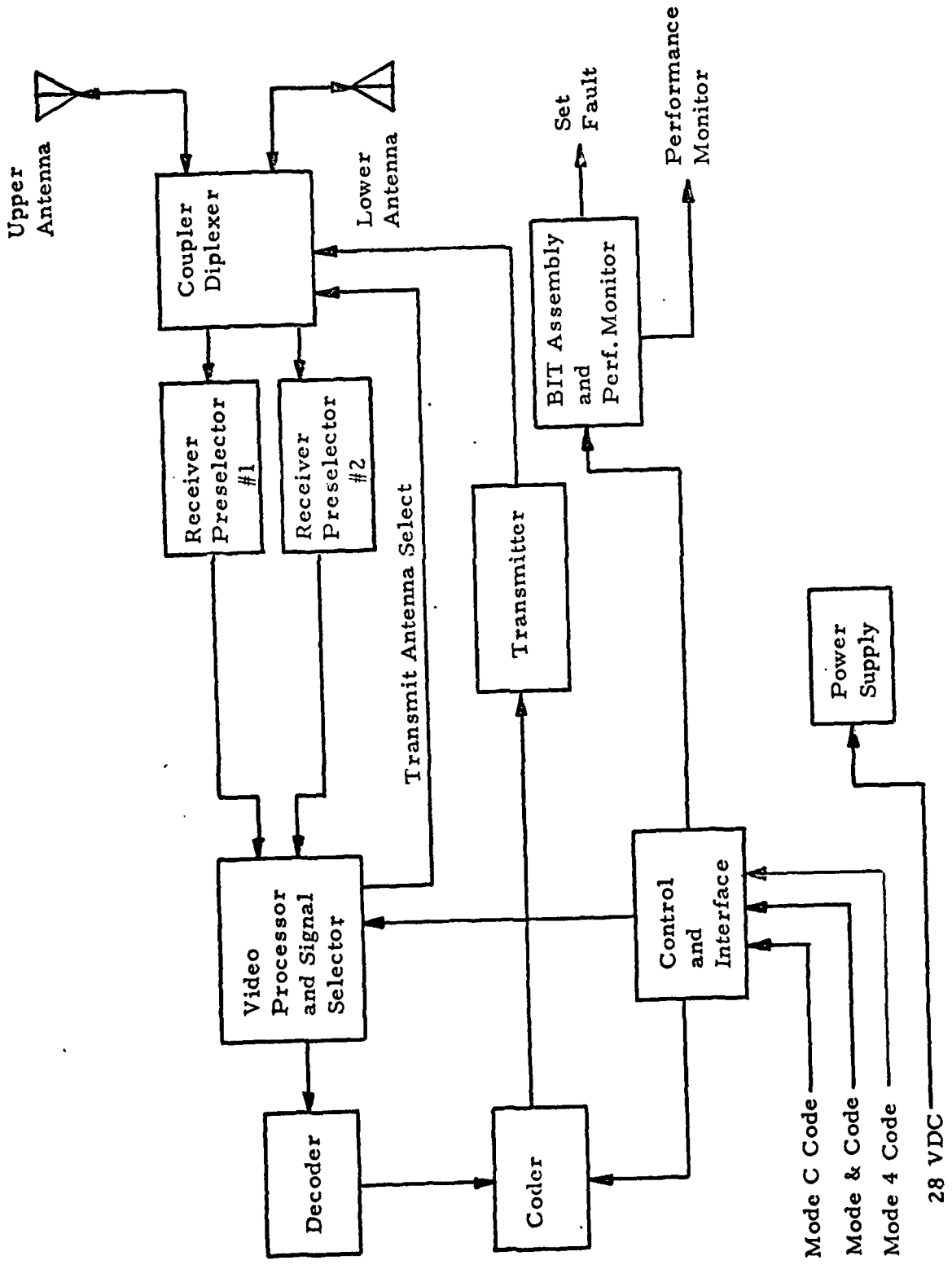


Figure 1. IFF Transponder Functional Diagram

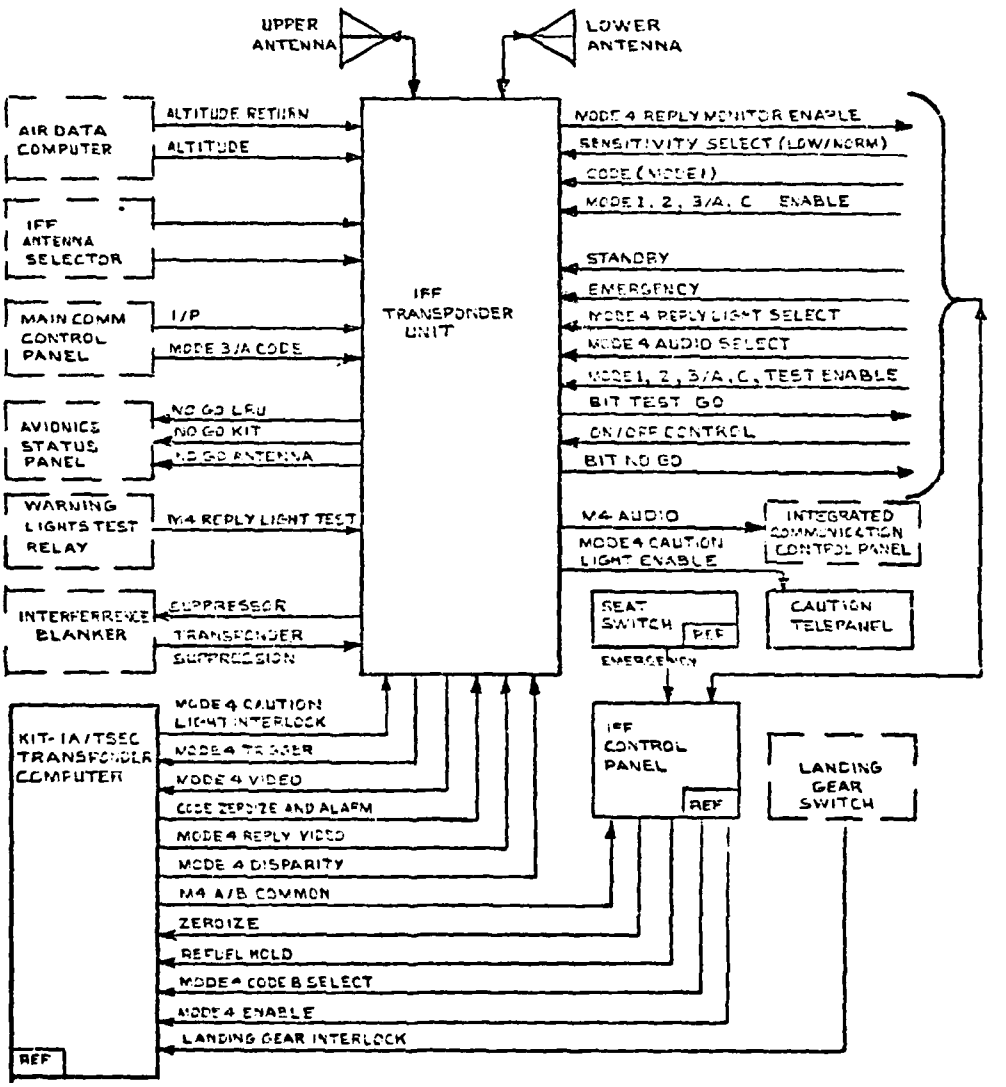


Figure 2A. F-15 IFF Transponder Functional Interface Diagram

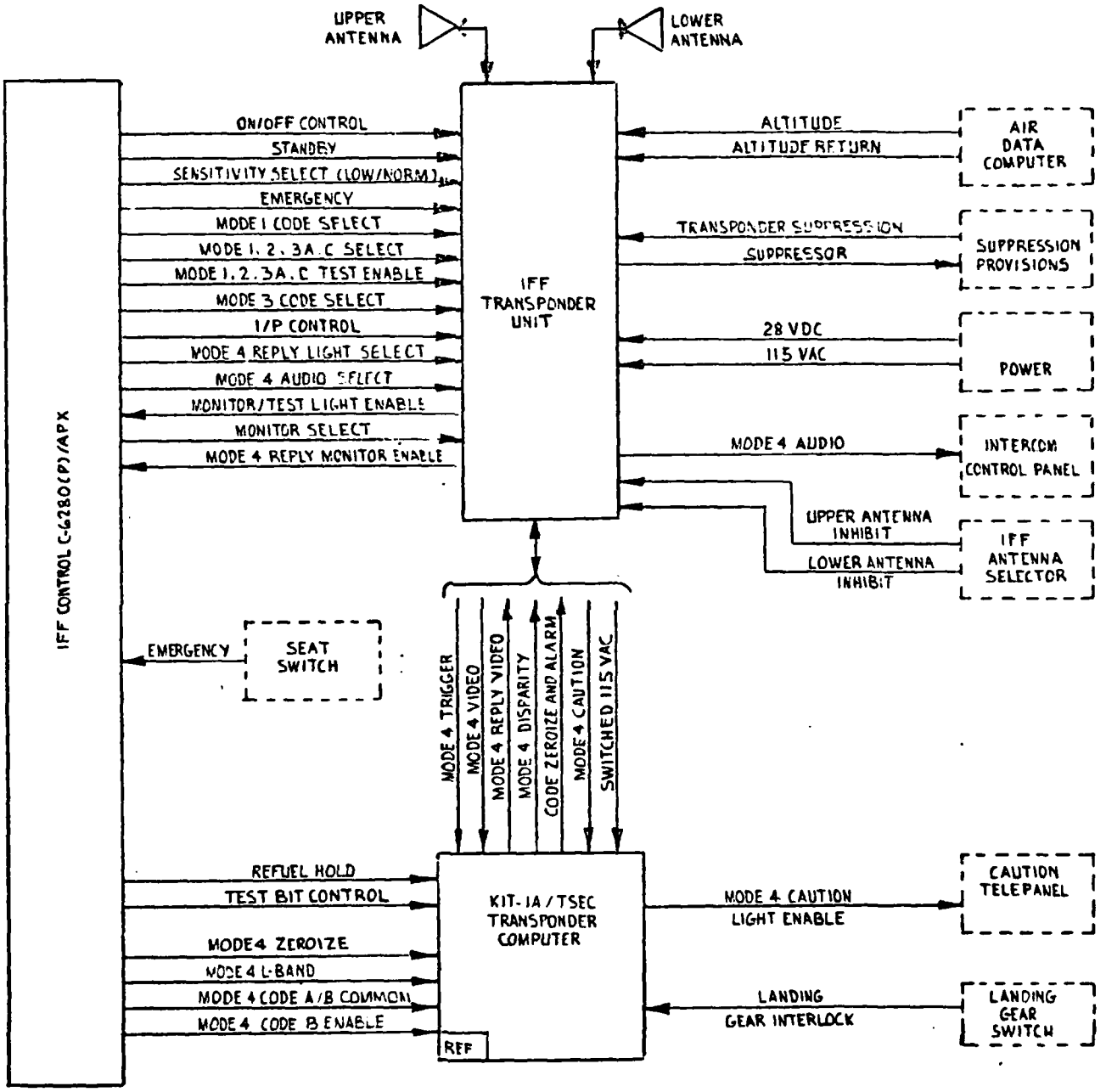


Figure 2B. IFF Transponder Functional Interface Diagram Using the C-6280 Control

Table 1. Interface Input/Output Signals

Input Signals			
Signal Name	Interface Type	F-15 Interfacing Unit	Interfacing Unit Using the C-6280 Control
Mode 4 Audio Select	Wiring	IFF Control Panel	C-6280(P)/APX Control
Mode 4 Reply Light Select	Wiring	IFF Control Panel	C-6280(P)/APX Control
Emergency	Wiring	IFF Control Panel	C-6280(P)/APX Control
Sensitivity Select (Low/ Norm)	Wiring	IFF Control Panel	C-6280(P)/APX Control
Mode 1, 2, 3/A, C, Select	Wiring	IFF Control Panel	C-6280(P)/APX Control
Mode 1 Code Select	Wiring	IFF Control Panel	C-6280(P)/APX Control
ON/OFF Control	Wiring	IFF Control Panel	C-6280(P)/APX Control
Pressure Altitude (Return)	Wiring	Air Data Computer Unit	Air Data Computer
Code Zeroize and Alarm	Wiring	KIT-1A/TSEC	KIT-1A/TSEC
Mode 4 Disparity	Wiring	KIT-1A/TSEC	KIT-1A/TSEC
Mode 4 Reply Video	Wiring	KIT-1A/TSEC	KIT-1A/TSEC
Trans. Suppression	Wiring	Interference Blanker Unit	Suppression Provisions
IFF Transponder RF (2)	Wiring	COMM/NAV/ IDENT Antenna Group	Antenna Group
Mode 1, 2, 3/A, C Test Enable	Wiring	IFF Control Panel	C-6280(P)/APX Control
Ident of Position Select	Wiring	MAIN COMM Control Panel	C-6280(P)/APX Control
Mode 3 Code Select	Wiring	MAIN COMM Control Panel	C-6280(P)/APX Control
Mode 4 Caution Light Interlock	Wiring	KIT-1A/TSEC	Not Used
Pressure Altitude	Wiring	Air Data Computer	Air Data Computer (MIL-C-27889 or equal)
Mode 4 Reply Test	Wiring	Warning Lights Test Relay	Not Used
Monitor Select	Wiring	Not Used	C-6280(P)/APX Control
Upper Antenna Inhibit	Wiring	IFF Antenna Selector	IFF Antenna Selector
Lower Antenna Inhibit	Wiring	IFF Antenna Selector	IFF Antenna Selector

Table 1. Interface Input/Output Signals (Continued)

Output Signals			
Signal Name	Interface Type	F-15 Interfacing Unit	Interfacing Unit Using the C-6280 Control
Mode 4 Audio	Wiring	Integrated Communications Control Panel	Intercom Control Panel
Mode 4 Trigger	Wiring	KIT-1A/TSEC	KIT-1A/TSEC
Mode 4 Video	Wiring	KIT-1A/TSEC	KIT-1A/TSEC
Suppressor	Wiring	Interference Blanker Unit	Suppression Provisions
IFF Transponder RF (2)	Wiring	COMM/NAV/ IDENT Antenna Group	Antenna Group
NO GO LRU 1	Wiring	Avionics Status Panel	Not Used
Mode 4 Reply Monitor Enable	Wiring	IFF Control Panel	C-6280(P)/APX Control
Bit Test Go	Wiring	IFF Control Panel	Not Used
Transponder Set NO GO	Wiring	IFF Control Panel	Not Used
Mode 4 Caution Light Enable	Wiring	Caution Telepanel	KIT-1A/TSEC
NO GO Kit	Wiring	Avionics Status Panel	Not Used
NO GO Antenna	Wiring	Avionics Status Panel	Not Used
Monitor/Test Light Enable	Wiring	Not Used	C-6280(P)/APX Control

a. Suppression pulses when the transponder is transmitting.

b. Mode 4 enable triggers and mode 4 video to the Transponder Computer, KIT-1A/TSEC.

c. Monitor signal when transponder is responding to an interrogation.

d. Monitoring of certain internal functions and provision of display warning for out of tolerance conditions upon initiation of the built-in test in any mode.

3.1.2.1.1 Interface Signal Characteristics. Interface signal characteristics for those signals and control functions used in the aircraft are defined in Appendix III. Additional interface signal characteristics for use with support equipment are defined in Appendix IV.

3.1.2.2 Physical interface.

3.1.2.2.1 Installation. The IFF transponder shall be installed in accordance with MIL-I-8700.

3.1.2.2.2 Thermal design. Thermal design requirements of MIL-E-5400 are applicable.

3.1.2.2.3 Service conditions - electrical. Electrical service conditions shall be in accordance with MIL-STD-704. Power consumption shall not exceed 65 watts, 28 volts DC. The transponder shall be capable of operating under the emergency power conditions of MIL-STD-704 for category B equipment.

3.1.2.2.3.1 Switched primary power. (Not used in F-15). Whenever the transponder is energized, power shall be made available at an external connector pin to supply electrical loads requiring a maximum of 2.0 amperes at 28 volts DC or 1 ampere at 115 volts AC. The power shall be controlled in such a manner that it is supplied when the receiver-transmitter is placed in any operating condition, but shall not be supplied when the receiver-transmitter is in the OFF condition. The circuit shall be capable of handling either 115 volts AC or 28 volts DC power meeting the requirements of MIL-STD-704 for Category B equipment.

3.1.2.2.4 Compatibility. The component shall be electrically compatible and shall function and meet all requirements defined in 3.2.1 when connected to the using subsystem with the inputs defined in 3.1.2. Also, the transponder shall be compatible with F-15 Avionics Intermediate Shop (CNI Test Station AN/GSM-230) and Avionics Depot Test Station (Test Station, IFF Transponder Modules, McDonnel Douglas Part No. 68D190033-1001), and Transponder Set Test Set AN/APM-406.

3.1.3 Major component list. The equipment covered herein is a single unit, IFF Transponder.

3.1.4 Government furnished property list. No Government furnished property is required.

3.1.5 Government loaned property list. No Government loaned property is required.

3.2 Characteristics.

3.2.1 Performance - The IFF transponder shall meet the requirements of Specification DOD AIMS 65-1000 and the following. In the event of a conflict between the requirements of specification DOD AIMS 65-1000 and those of this specification, such shall be brought to the attention of the procuring activity.

3.2.1.1 Receiver. The IFF diversity transponder shall contain two receivers to permit receiver diversity operation. Each receiver shall have the following characteristics.

3.2.1.1.1 Frequency. The center of the receiver band pass shall be 1030 MHz.

3.2.1.1.2 Frequency stability. The center of the receiver bandwidth shall be within ± 1.5 MHz of the 1030 MHz.

3.2.1.1.3 Sensitivity (minimum triggering level MTL). The sensitivity requirements of Paragraph 3.2.1.1.3.1 and Paragraph 3.2.1.1.3.2 shall apply to each receiver when the interrogation pulses (Paragraph 3.2.1.2) are supplied by a 50 Ohm generator calibrated in terms of its closed-circuit voltage at the antenna receptacle of the IFF Transponder under normal test conditions. The sensitivity of the receiver is defined as the amplitude of a Mode 1, 2, 3/A, and C r-f interrogation (pair of pulses) and the interrogation pattern that will provide a Mode 4 enable trigger and a Mode 4 interrogation pattern to the computer resulting in a Mode 4 reply, both to be generated to at least 90% of the interrogation rate. The interrogation signals should be of nominal pulse spacing, width, and frequency.

3.2.1.1.3.1 Normal sensitivity. The sensitivity of the receiver-transmitter shall be such that the minimum triggering level is at least 90 dB below 1 volt (-77 dBm). Normal sensitivity shall be adjustable between 90 dB below 1 volt (-77 dBm) and 86 dB below 1 volt (-73 dBm) by means of a service adjustment equipped with a suitable locking device. This adjustment shall be set to a minimum triggering level of 89 dB below 1 volt (-76 dBm).

3.2.1.1.3.2 Low sensitivity. Provisions shall be made within the equipment to provide a low sensitivity level. Low sensitivity shall be adjustable from 12 dB to 25 dB below the normal sensitivity setting selected by means of a service adjustment equipped with a suitable locking device. This adjustment shall be set to a minimum triggering level of 78 dB below 1 volt (-65 dBm).

3.2.1.1.3.3 Sensitivity level selection. Selection of either normal (NORM), or low (LOW), sensitivity shall be by means of the Integrated Identification Control or C-6280 (P)/APX.

3.2.1.1.4 Sensitivity stability. Sensitivity of each receiver channel shall not vary more than ±3 dB under any combination of specified service conditions.

3.2.1.1.5 Random triggering rate. With a 51 ohm resistive load connected to the antenna terminal, with the absence of an interrogating signal with the equipment set to respond to at least Mode 3/A and C, and with the equipment set for normal triggering level; the random triggering rate shall not exceed 5 pulses per second, integrated over an interval equivalent to at least 100 random triggers.

3.2.1.1.6 Bandwidth. The bandwidth between points 6 dB from maximum response shall not be less than 7.0 nor more than 9.0 MHz under normal test conditions. Under any combination of specified service conditions, the bandwidth shall not be less than 6.3 nor more than 11 MHz. Points on the selectivity curve at ± 3 MHz from center frequency shall not differ in amplitude by more than 1 dB. If 2 or more peaks occur between the points 6 dB down, the dip between any 2 peaks shall not be more than 1.0 dB below the level of the lower peak. The skirt bandwidth shall be such that sensitivity of the receiver is at least 60 dB down at 1030 ± 25 MHz and beyond.

3.2.1.1.7 Spurious responses. With the receiver operating, the response to cw signals, as measured by the voltage at the detector output, shall be at least 70 dB below the response at 1030 MHz at all frequencies lower than 1010 MHz and higher than 1050 MHz.

3.2.1.1.8 Friendly interference. The receiver shall operate in the presence of interfering signals consisting of cw and audio-modulated cw signals, randomly spaced pulses and regularly spaced pulses of any spacing, and shall meet the following requirements:

a. If the interrogating signal to which the equipment should reply is between 3 and 20 dB above the normal triggering level, an interfering signal 10 dB down from the interrogating signal shall not reduce the number of replies by more than 50 percent.

b. If the interrogating signal is between 20 and 50 dB above the normal triggering level, an interfering signal at a level 3 dB down from the interrogating signal shall not reduce the number of replies by more than 50 percent.

c. If the interfering signal consists of randomly spaced pulses only and the interrogating signal is a Mode 1, 2, 3/A or C interrogation that is 10 dB above the interfering signal, the equipment shall reply to at least 90 percent of the interrogations where the randomly spaced pulses are not recognized as normal or side lobe interrogations.

d. An interfering signal consisting of pulses of widths up to 0.8 microseconds and at a signal level equal to or less than that of the interrogating signal shall not cause shifts in the apparent position or strength of neighboring pulses of the interrogating signal. This requirement applies for all spacing between interrogation and interfering pulses except for pulse spacing less than 75 nanoseconds at the 50% point between trailing and leading edge and where overlap occurs causing RF cancellation effects.

3.2.1.1.9 Suppressor input operation. Upon application to the receiver-transmitter of a suppression pulse, decoding of Modes 1, 2, 3/A, C, and 4 shall be suppressed for an interval starting not more than 1 microsecond after the suppression pulse has reached an amplitude of 3 volts and shall continue for at least the duration of the suppression pulse. After the end of the suppression pulse, the receiver-transmitter shall regain normal or low receiver sensitivity (depending on setting), within 3 dB, no later than 15 microseconds after the suppression pulse has fallen to 0.5 volts. The equipment shall be insensitive to an rf pulse input of 50 volts peak (25W) applied to the antenna terminal for the duration of the suppression pulse. Two separate suppression input capabilites shall be provided.

a. The suppression input pulse for F-15 operation shall have the following characteristics:

(1) Amplitude: +6 to +15 volts
(2) Polarity: Positive
(3) Duration: 1 to 350 microseconds
(4) Load impedance: 680 ohms ± 10%
(5) Rise time: (10-90%) 0.5 microsecond max.
(6) Fall time: (90-10%) 1.5 microseconds max.
(7) Duty cycle: 20% max.

b. The suppression input pulse for other than F-15 operation shall have the following characteristics:

(1) Amplitude: 15 to 70 volts
(2) Duration: 1 to 350 microseconds
(3) Polarity: Positive
(4) Load impedance: 2200 ohms in parallel with 50 PF
(5) Rise time: At least 10 volts per microsecond
(6) Decay time: Peak amplitude to 1.0 volt within 10 microseconds
(7) Duty cycle: 20% max.

3.2.1.1.10 Suppression output. Suppression output shall be provided to produce an output for each Mode 1, 2, 3/A and C output train and for each auxiliary trigger or Mode 4 reply input. The suppression output pulse shall have the following characteristics:

a. Amplitude: +20 to +40 volts
b. Polarity: Positive
c. Load impedance: 300 ohms to 2.2K ohms shunted by 1850 P.F.
d. Start time: The pulse shall reach 20 volts minimum before the RF output pulse has reached 10% of its amplitude. Maximum rise time (10-90%) shall be 0.5 microsecond.
e. Stop time: Suppression output shall be less than 1.0 volt 3.0 microseconds after the last RF pulse of the reply pulse train has fallen to 10% amplitude. Maximum fall time (90-10%) shall be 1.5 microseconds.
f. Duty cycle: 15 % max.

3.2.1.1.10.1 Decoder suppression. The suppression output shall also be used to provide internal suppression and shall suppress the decoding action of the decoder.

3.2.1.1.11 Echo rejection. The receiver-transmitter shall contain necessary circuitry to permit normal operation in the presence of echoes of the interrogating signals and side lobe suppression control pulses in accordance with the following.

3.2.1.1.11.1 SIF desensitization. Upon receipt of any pulse more than 0.4 microsecond in duration and up to 50 dB above minimum triggering level, the receiver shall be desensitized to a level that is within 6 dB of the amplitude of the desensitizing pulse. It shall remain at that level for a period of between 2 to 4 microseconds measured from the trailing edge of the desensitizing pulse. Following this period the receiver sensitivity shall recover linearly at a rate not exceeding 4.5 dB per microsecond to within 3 dB of minimum triggering level. The total recovery time shall not exceed 15 microseconds.

3.2.1.1.11.2 Mode 4 desensitization. Upon receipt of the fourth pulse of the Mode 4 sync pattern (each pulse more than 0.4 microsecond in duration and spaced by 2 microseconds) with signal strength up to 50 dB above minimum triggering level, the receiver shall be desensitized so that an additional pulse spaced at 8.0 ± 0.15 microsecond referenced to the leading edge of the first pulse and 9 dB or more below the signal level of the fourth pulse shall not be detected. The receiver shall remain at the desensitized level set by the fourth pulse for the duration of the Mode 4 suppression period unless terminated by a disparity pulse. A disparity pulse or the end of the Mode 4 suppression period shall cause the receiver sensitivity to recover within 3 dB of minimum triggering level within 2 microseconds after termination. During the desensitized period, any pulse of amplitude greater than the desensitized level shall not cause further desensitization. The desensitization characteristic shall not droop more than 1 dB, 65 microseconds after the fourth sync pulse.

3.2.1.1.12 Interrogation sidelobe suppression (ISLS).

3.2.1.1.12.1 ISLS control pulse characteristics. The ISLS control pulse will have the following characteristics:

a.	Pulse Width	0.8 ± 0.1 microsecond for Modes 1, 2, 3/A and C or 0.5 ± 0.1 microsecond for Mode 4.

b.	Pulse Position	2 ± 0.15 microsecond after the first pulse of a Mode 1, 2, 3/A, and C interrogation or 8.0 ± 0.15 microsecond after the first pulse of a train of four 0.5 microsecond pulses spaced 2 microseconds for Mode 4.
c.	Rise Time	Between 0.05 and 0.1 microseconds.
d.	Decay Time	Between 0.05 and 0.2 microseconds.
e.	Pulse Frequency	Within ± 0.2 MHz of the frequency of the interrogation pulse (1030 MHz nominal).

3.2.1.1.12.2 Suppression. The decoding of SIF modes shall be suppressed (not less than 99% efficiency) when the received amplitude of the ISLS control pulse is equal to or in excess of the received amplitude of the first interrogation pulse and spaced 2 ± 0.15 microseconds from it. The suppression of the decoder shall be for a period of 35 ± 10 microseconds and shall be capable of being reinitiated for the full duration within 2 microseconds after the end of any suppression period. The suppression gate shall only be generated when an SIF mode is enabled. The suppression gate resulting from the first two pulses of a Mode 4 sync pattern shall be terminated by the Mode 4 trigger resulting from the Mode 4 sync pattern and the generation of additional suppression gates during the Mode 4 interrogation shall be inhibited.

3.2.1.1.12.3 Non-suppression. The suppression of the decoder shall not take place when the receiver amplitude of the first interrogation pulse is 9 dB or more in excess of the received amplitude of the ISLS control pulse, or when the spacing of the first interrogation pulse and the ISLS is more than 216 microseconds or less than 1.3 microseconds.

3.2.1.1.12.4 Gray region. If the level of the interrogation pulse is greater than the level of the suppression pulse but greater by less than 9 dB, suppression may or may not take place.

3.2.1.1.12.5 ISLS dynamic range. The ISLS suppression and nonsuppression characteristics shall apply over a received signal amplitude range from the minimum triggering level to 50 dB above that level.

3.2.1.1.12.6 Side-lobe-suppression rate limiter. A side-lobe-suppression rate limiter, using a sensitivity reduction type circuit, shall be incorporated. At a suppression rate in excess of 5000 per second, receiver sensitivity shall be reduced to limit the suppression rate to a magnitude of 10,000 per second.

3.2.1.1.13 Pulse width discrimination. Single-pulse or paired-pulse signals of received amplitude between the minimum triggering level and 6 dB above this level, of a duration less than 0.3 microsecond, shall not cause the receiver-transmitter to initiate more than 10% reply or suppression action. Mode 4 interrogation signals of received amplitude between the minimum triggering level and 6 dB above this level, of a duration less than 0.20 microsecond, shall not cause the receiver-transmitter to initiate more than 10% Mode 4 trigger or suppression action. With the exception of pulses having amplitude variations approximating a normal interrogation pulse pair condition, any single pulse of a duration more than 1.5 microseconds shall not cause the receiver-transmitter to initiate reply or suppression action.

3.2.1.1.14 Internal suppression. Internal suppression of the decoder shall be generated as specified below.

3.2.1.1.14.1 Suppression during Mode 4 interrogation. Decoding of all SIF modes shall be suppressed when the first 4 pulses of a Mode 4 interrogation are received. Once a Mode 4 enabling trigger has been generated, the generation of additional Mode 4 triggers will likewise be suppressed. Suppression due to a Mode 4 interrogation shall continue for at least 75 microseconds, but not more than 100 microseconds after the fourth pulse. The application of a disparity pulse shall terminate the suppression of the generation of Mode 4 triggers but the suppression of the decoding of SIF modes shall continue for the full duration. The suppression shall be capable of being reinitiated for the full duration within 6 microseconds after the end of any suppression period. All decoding circuits shall be insensitive to interrogation pulses received before the end of the suppression period. The first 2 pulses of a Mode 4 interrogation shall also be recognized as a legitimate ISLS control signal and processed as required when an SIF mode is enabled.

3.2.1.1.14.2 Suppression of any mode during transmission of SIF replies. Decoding of SIF modes and Mode 4 sync patterns shall be suppressed during transmission of SIF replies. Suppression shall terminate at 35 ± 10 microseconds after the last transmitted pulse of an SIF reply. In the case of Mode 4, recovery to within 3 dB of minimum trigger level shall occur within 5 microseconds after the last transmitted pulse.

3.2.1.1.14.3 Suppression during transmission of Mode 4 replies. Decoding of Modes 1, 2, 3/A, and Mode 4 sync patterns shall be suppressed during transmission of Mode 4 replies. For SIF, recovery to within 3 dB of MTL shall occur 35 ± 10 microseconds after the last Mode 4 transmitted pulse. For Mode 4, recovery to within 3 dB of MTL shall occur within 5 microseconds after the last Mode 4 transmitted pulse. If a Mode 4 reply occurs during an SIF reply, the SIF reply shall be terminated.

3.2.1.2 Decoding performance. The equipment shall include decoding circuits for the purpose of distinguishing 5 modes of interrogation over a range of received signals from minimum triggering level to 50 dB above minimum triggering level (nominal). Each mode will consist of rf pulses which have the following characteristics: (In addition, interrogations made up of wider pulses up to 1.5 microseconds may be decoded and replies generated with no degradation in performance except that the decoding tolerance may be proportional to pulse width up to the limits specified herein.)

Mode	Interrogation Code
1	2 pulses spaced 3 ± 0.2 microseconds
2	2 pulses spaced 5 ± 0.2 microseconds
3/A	2 pulses spaced 8 ± 0.2 microseconds
C	2 pulses spaced 21.0 ± 0.2 microseconds
4	4 sync pulses referenced from the first in multiples of 2 microseconds followed by as many as 33 additional pulses spaced in multiples of 1 microsecond. A one-microsecond spacing of pulses occurs only when the 5th pulse (ISLS) is present and is followed within 1 microsecond by another pulse (AII). All others are spaced at least 2 microseconds leading edge to leading edge. Pulse position tolerance for all pulses is ± 0.1 microsecond referenced to the first pulse except the 5th pulse which is spaced at 8.0 ± 0.15 microseconds.

3.2.1.2.1 Decoder, mode 1. Under normal operating conditions, the decoder shall:

a. Cause the coder to generate a Mode 1 reply in response to a Mode 1 interrogation.

b. Not respond to a double-pulse interrogation with characteristics of Mode 1 when the pulse spacing is less than 2.5 microseconds or more than 3.75 microseconds.

c. Not cause the coder to generate a Mode 1 response to a Mode 2 interrogation with an SLS pulse.

3.2.1.2.2 Decoder, mode 2. The decoder shall:

a. Cause the coder to generate a Mode 2 reply in response to a Mode 2 interrogation.

b. Not cause the coder to generate a Mode 2 response to a double-pulse interrogation with characteristics of Mode 2 when the pulse spacing is less than 4.5 microseconds or more than 5.75 microseconds.

c. Not cause the coder to generate a Mode 2 response to a Mode 4 interrogation.

3.2.1.2.3 Decoder, mode 3/A. The decoder shall:

a. Cause the coder to generate a Mode 3/A reply in response to a Mode 3/A interrogation.

b. Not cause the coder to generate a Mode 3/A response to a double-pulse interrogation with characteristics of Mode 3/A when the pulse spacing is less than 7.2 microseconds or greater than 8.8 microseconds.

c. Not cause the coder to generate a Mode 3/A response to a Mode 4 interrogation.

3.2.1.2.4 Decoder, mode 4. When a Mode 4 interrogation is received the decoder shall:

a. Generate a trigger pulse at Mode 4 trigger output no later than 0.6 microsecond after receiving the fourth interrogation pulse and at no other time during the interrogation.

b. Not generate a Mode 4 trigger when any of the first four interrogation pulses are spaced more than ± 0.6 microsecond from nominal positions.

c. Not cause the decoder to generate a Mode 1, 2, 3/A or C reply.

3.2.1.2.5 Decoder, mode C. When a Mode C interrogation is received, the decoder shall:

a. Cause an output to appear at the Mode C decoder output.

b. Not cause the coder to generate a Mode C response to a double-pulse interrogation when the pulse spacing is equal to or less than 20.2 microseconds or equal to or more than 21.8 microseconds.

c. Not cause the coder to generate a Mode C response to a Mode 4 interrogation.

3.2.1.2.6 Single pulse decoding. The decoder shall not cause the coder to generate any response to a single pulse of any duration provided that:

a. The pulse carried no ripples comparable to normal interrogations.

b. No cw is present, capable of producing beats comparable to normal interrogation.

c. Pulse width does not correspond to interrogation pulse spacing when the single pulse is off frequency.

3.2.1.2.7 Automatic overload control. A sensitivity-reduction circuit shall be incorporated in the equipment to limit the number of generated pulse trains for Mode 1, 2, 3/A, and C interrogations without regard to the number of pulses in each reply. Sensitivity reduction in excess of 3 dB shall not take effect until at least 90 percent of the selected limit is exceeded. Beyond the selected limit, sensitivity reduction shall be gradual so as to prevent weaker interrogations from denying transponder service to stronger interrogations as a result of over interrogations. When the over interrogation is made up of two signals differing by more than 10 dB, each with a PRF equal to 75 percent of the selected limit, the sensitivity reduction shall reduce the reply rate by limiting replies to the weaker interrogation without reducing the reply rate to the stronger interrogations. Sensitivity reduction shall prevent the reply rate from exceeding 125 percent of the selected value.

Modes 1, 2, 3/A, C, I/P	Selected limit:	1200 replies per second
Emergency (Mode 1 and Mode 3/A)	Maximum limit:	1500 replies per second
Emergency (Mode 2)	Selected limit:	800 replies per second
	Maximum limit:	1000 replies per second

3.2.1.2.7.1 Rate limit adjustment. Means shall be provided to adjust the reply rate from one-third to two times those values specified above.

3.2.1.2.7.2 Action time. If the interrogation rate is suddenly increased from 800 to 1500 per second, the sensitivity of the receiver shall be reduced at least 20 dB within 0.2 second. Upon decreasing the interrogation rate to 800 per second, the sensitivity of the receiver shall return to within 3 dB of normal sensitivity within 0.025 second.

3.2.1.3 Coder. In response to outputs from the decoder, the coder shall produce pulse trains capable of modulating the transmitter oscillator.

3.2.1.3.1 Coder control. Operation of the IFF Controls shall permit selection of the following conditions of operation:

Standby
Mode 1
Mode 1 Test
Mode 2
Mode 2 Test
Mode 3/A
Mode 3/A Test
Mode C
Mode C Test
Emergency Response
Identification of Position (Ident)

3.2.1.3.2 Standby. In the standby control position, the equipment shall operate normally except the modulator or transmitter shall be disabled. The absence of replies on Mode 4 due to the standby condition shall enable the Mode 4 caution light in the same manner as if replies were absent due to other reasons. In addition, Mode 4 interrogation audio indication shall be possible. Full functional capability shall be restored immediately upon switching to normal or low sensitivity.

3.2.1.3.3 Coder, mode 1. For each pulse appearing at the Mode 1 decoder output, when the Mode 1 switch on the Transponder Control Panel is energized, a pulse train shall be generated containing from 0 to a maximum of 5 information pulse positions plus 2 framing pulses which are spaced 20.3 ±0.05 microseconds. The information pulses shall be referenced from the first framing pulse in multiples of 2.9 microseconds. Each pulse shall be located within ±0.05 microsecond of the reference position. The position where a sixth information pulse would appear shall not be used. From the specified 5 information pulses, a total of 32 different codes, selected on the Integrated Identification Control or C-6280 (P)/APX shall be available.

3.2.1.3.4 Coder, mode 2. For each pulse appearing at the Mode 2 decoder output when the Mode 2 switch on the Transponder Control Panel is energized, a pulse train shall be generated containing from 0 to a maximum of 12 information pulse positions, plus 2 framing pulses that are spaced 20.3 ± 0.05 microseconds. The information pulses shall be referenced from the first framing pulse in multiples of 1.45 microseconds. Each pulse shall be located within ±0.05 microsecond of the reference position. The seventh information pulse position shall not be used. Four rotary switches shall be provided on the front panel of the equipment for selecting any of the 4096 code combinations of the information pulses specified.

3.2.1.3.5 Coder, mode 3/A. For each pulse appearing at the Mode 3/A decoder output when the Mode 3/A switch on the Transponder Control Panel is energized, a pulse train shall be generated containing from 0 to a maximum of 12 information pulse positions, plus 2 framing pulses: spaced 20.3 ± 0.05 microseconds. The information pulse positions shall be referenced from the first framing pulse in multiples of 1.45 microseconds. Each pulse shall be located within ±0.05 microsecond of the reference position. The seventh information pulse position shall not be used. Means shall be provided for selecting the 4096 code combinations of the specified information pulses on the Integrated Identification Control or C-6280 (P)/APX.

3.2.1.3.6 Coder, mode C. For each pulse appearing at the Mode C decoder output, when a switch on the Transponder Control Panel is set to the Mode C position and the receiver-transmitter is connected to the Air Data Computer, a pulse train shall be generated containing from 0 to a maximum of 11 information pulse positions, and 2 framing pulses. When the first two conditions stated above exist, but the receiver-transmitter is not connected to the Air Data Computer, only two framing pulses shall be generated. The framing pulses shall be spaced

20.3 ± 0.05 microseconds apart. The information pulses shall be referenced from the first framing pulse in multiples of 1.45 microseconds. Each information pulse shall be located ±0.05 microsecond from the reference position. The seventh information pulse position (X) and the ninth information pulse position (D_1) shall not be used.

3.2.1.3.7 Output pulse characteristics. For each pulse generated by the coder, an output pulse shall be transmitted. The interval between the first and second framing pulse of any code train in the reply shall be 20.3 ± 0.05 microseconds.

3.2.1.3.8 Emergency response provisions. When Emergency Mode is selected the coder shall generate multiple pulse trains in accordance with a, b, c, and d:

a. Mode 1: For each trigger pulse appearing at the Mode 1 decoder output, the code in use will appear in the first train, followed by 3 sets of framing pulses, each spaced 24.65 ± 0.10, 44.95 ± 0.15, 49.30 ± 0.20, 69.60 ± 0.25, 73.95 ± 0.30, and 94.25 ± 0.35 microseconds measured from the first framing pulse of the first train.

b. Mode 2: For each trigger pulse appearing at the Mode 2 decoder output, the code in use will appear in the first train, followed by 3 sets of framing pulses, each pulse spaced at intervals specified for Mode 1.

c. Mode 3/A: For each trigger pulse appearing at the Mode 3/A decoder output, the code number 7700 will appear in the first train, followed by 3 sets of framing pulses, each pulse spaced at intervals specified by Mode 1.

Other modes: The emergency function shall not affect the normal operation of Mode C and Mode 4.

3.2.1.3.9 Identification of position (I/P). Response provisions shall be made for I/P operation. A time delay shall be provided so that when the I/P is initiated, Ident operation will exist for a preset time period between 15 and 30 seconds after activation of the I/P feature. The I/P timing operation shall be capable of being reinitiated at any time. When the radio receiver-transmitter is switched to I/P, the coder shall generate coded replies with the following characteristics:

a. Mode 1: For each trigger appearing at the Mode 1 decoder output, the code in use shall appear twice. The second pulse train shall be spaced 24.65 ± 0.10 microseconds as measured between the leading edges of the first framing pulse of the first train and first pulse of the second train and 4.35 ± 0.05 microseconds as measured between the leading edges of the second framing pulse of the first train and the first pulse of the second train.

b. Mode 2: For each trigger pulse appearing at the Mode 2 decoder output, the code in use shall appear followed by a single pulse spaced 24.65 ± 0.10 microseconds from the first framing pulse of the train and 4.35 ± 0.05 microseconds from the second framing pulse.

c. Mode 3/A: For each trigger pulse appearing at the Mode 3/A decoder output, the code in use shall appear followed by a single pulse spaced 24.65 ± 0.10 microseconds from the first framing pulse of the train and 4.35 ± 0.05 microseconds from the second framing pulse.

d. Other Modes: The Ident function shall not affect the operation of Mode C and Mode 4.

3.2.1.3.10 Coder output pulse selection. The coder shall be designed to permit selection of the Mode 1 and Mode 3/A code configuration to be transmitted by operation of the Integrated Identification Control. Means shall be provided for selection of Mode 2 code configurations on the front panel of the equipment. Provisions shall be made to accept digitized altitude information from the Air Data Computer.

3.2.1.3.11 Code number assignments. Every configuration of Mode 1, 2, and 3/A information pulses shall be assigned a code number. The following numbers shall be used.

3.2.1.3.11.1 Mode 1. Code numbers 00 through 73 shall designate the Mode 1 code. The applicable 5 information pulses shall be divided into 2 groups (A and B) with A containing the first 3 pulses and B containing the last 2 pulses. The 3 information pulses in group A shall be numbered in order serially (1, 2, and 4) and the 2 pulses in group B shall be numbered in order (1 and 2). The appropriate code number shall be obtained by adding the pulse numbers (1, 2, and 4) of the pulses present within each group and conbining the 2 sums in order (A, B) to form the serial code numbers. Thus code 03 consists of no pulses in group A, and pulses 1 and 2 of group B; code 51 consists of pulses 1 and 4 of group A, and pulse 1 of group B, etc.

3.2.1.3.11.2 Mode 2. Code numbers 0000 through 7777 shall designate the Mode 2 code. The applicable 12 information pulses (it is not proposed to use the pulse position halfway between framing pulses) shall be divided into 4 groups of 3 pulses. The individual pulses of each group shall be spaced 2.9 microseconds apart and numbered in order (1, 2, and 4). The position of the first pulse of each group, measured from the initial framing pulse, shall be as follows:

GROUP	TIME FROM FIRST FRAMING PULSE (MICROSECONDS)
A	2.9
B	11.6
C	1.45
D	13.05

The appropriate code number shall be determined by adding the sum (1, 2, and 4) of the pulses present within each group. These sums shall then be combined in order (A, B, C, D) to form a 4-digit serial number for the particular code. For example, code 2435 will have information pulses at the 1, 3, 4, 9, 12 and 13 information pulse positions.

3.2.1.3.11.3 Mode 3/A. Code numbers 0000 through 7777 shall designate the Mode 3/A code. The same system shall apply to Mode 3/A as that described in Paragraph 3.2.1.3.11.2.

3.2.1.3.11.4 Mode C. A hybrid reflected binary (Gray) code shall designate the Mode C code. The X and D1 pulse positions shall not be used.

3.2.1.4 Mode 4. When operating with the external KIT-1A/TSEC transponder computer, the receiver-transmitter shall perform the following functions.

3.2.1.4.1 Mode 4 input signals.

3.2.1.4.1.1 Mode 4 reply input. A video input shall be provided for application of Mode 4 reply triggers to this equipment. For each trigger, an output pulse shall be generated.

3.2.1.4.1.2 Mode 4 disparity pulse input. A video input shall be provided for application of Mode 4 disparity pulses to the equipment.

3.2.1.4.2 Mode 4 output signals.

3.2.1.4.2.1 Mode 4 trigger. The equipment shall generate a Mode 4 enabling trigger for the KIT-1A/TSEC transponder computer upon recognition of the Mode 4 sync pattern.

3.2.1.4.2.2 Mode 4 video. The IFF transponder shall provide Mode 4 video as specified with the following characteristics:

a.	Amplitude	1.5 to 5 volts across an impedance of 90 ± 10% ohms
b.	Polarity	Positive
c.	Duration	0.45 to 0.65 microseconds for rf input pulse widths between 0.4 and 0.6 microseconds
d.	Rise Time	0.1 microsecond max.
e.	Decay Time	0.2 microsecond max.
f.	Undesired Signal Plus Quiescent dc Voltage	± 0.5 volts max during the period beginning with the leading edge of the Mode 4 Trigger and ending 70 μsec later.
g.	Droop	1.5 dB maximum over the complete interrogation.

3.2.1.4.2.3 Mode 4 reply light enable. Provisions shall be made to enable the Mode 4 reply light only when four or more Mode 4 replies are transmitted within a 0.033 second interval, or replies are transmitted at a rate of 50 or more per second for 0.25 seconds, as indicated by the presence of Mode 4 reply inputs followed within 0.5 microsecond by the transmission of rf reply pulses. The reply light enabling voltage shall not be generated if transmitted replies are generated at a constant rate of less than ten per second. The reply light shall remain enabled for a period of 2 to 5 seconds after the end of the enabling condition. In addition, a Mode 4 reply light test line shall be provided. The test line shall be an open/ground signal and shall activate the reply light in the ground condition independently of the power ON/OFF status of the Transponder.

a. For F-15 operation, the Mode 4 reply monitor enable output shall be an open for OFF and a ground level for ON. The reply light shall be powered by 8 volts AC to 28 volts AC, 400 Hz. The transponder enabling output circuitry shall supply a maximum of 100 ma in the ground (ON) condition.

b. For use with the C-6280 control, the Mode 4 reply monitor enable output shall be +28 volts DC for ON and an open for OFF. The transponder enabling output circuitry shall supply a maximum of 200 ma in the +28 volts DC (ON) condition. (not used in F-15).

3.2.1.4.2.4 Caution light enable. Provisions shall be made to enable an external caution light whenever either of the following conditions exist and the Mode 4 reply light is not enabled.

a. Zeroized Mode 4 reply code as indicated by grounding of a control lead by the KIT-1A/TSEC transponder computer.

b. The equipment has failed to reply to valid Mode 4 interrogations 4 or more times within a 0.033 second interval or to valid Mode 4 interrogations at a rate greater than 50 per second for 0.25 second. A failure shall be considered to have occurred when a Mode 4 sync pattern is recognized but not followed within 270 microseconds by either a Mode 4 reply indication or a disparity pulse. The circuitry used to determine the presence of a disparity or reply shall be capable of being reinitiated as early as 2.0 microseconds following receipt of a Mode 4 disparity or reply. An exception to the "failure to reply" indication shall apply when the failure to reply to a valid Mode 4 interrogation occurs at a constant rate of less than 10 times per second. The lamp shall remain on for a period of from 2 to 5 seconds after the end of the enabling condition.

c. The Caution light shall not be enabled whenever the conditions of 3.2.1.4.2.3 exists.

d. For F-15 operation the Mode 4 caution light enable output shall be an open for ON and a ground level for OFF. The transponder enabling output circuitry shall supply a maximum of 100 ma in the ground (OFF) condition.

e. For use with the C-6280 control, the Mode 4 caution light enable output shall be +28 volts DC for an ON and an open for OFF. The transponder enabling circuitry shall supply a maximum of 1.0 ampere for the +28 volts DC (ON) condition. (not used in F-15).

3.2.1.4.2.5 Audio output. An audio signal shall be available whenever both of the following conditions are satisfied.

a. An audio enable signal is provided.

b. Presence of a Mode 4 trigger when not followed by a disparity pulse.

3.2.1.4.2.6 Mode 4 computer duty limiter. A sensitivity reduction type circuit shall be incorporated in the equipment to limit the number of Mode 4 trigger pulses generated in response to Mode 4 interrogations. Adjustment shall be provided to set the limit Mode 4 trigger rate to any level between 500 and 3,000 triggers per second. Sensitivity reduction in excess of 3 dB shall not take effect until at least 90 percent of the selected limit is exceeded. Beyond the selected limit, sensitivity reduction shall be gradual to prevent weak interrogations from denying transponder service to stronger interrogations as a result of over interrogation. When the over interrogation is made up of two signals, each with a PRF equal to 75 percent of the selected limit, the sensitivity reduction shall operate by limiting the trigger rate resulting from the weaker interrogations without reducing the trigger rate due to the stronger interrogations. Sensitivity reduction shall prevent the reply rate from exceeding 125 percent of the selected value for signal levels up to 50 dB above MTL. The selected limit shall be set to 1200 replies per second.

3.2.1.5 Mode C. Control of the Mode C reply code shall be obtained from external altitude reporting equipment.

3.2.1.5.1 Mode C Input. An input connection shall be provided to accept Mode C reply code information from devices using either electronic keying or a disc-type encoder unit.

3.2.1.5.2 Noise Filtering on Mode C Control Leads. Suitable filtering shall be provided within the IFF transponder to limit the capacitance discharge current from an external encoder disc brush to 1.5 milliamperes or less when added to the steady-state brush current. The use of inductive-type filtering shall not be permitted.

3.2.1.5.3 Source and Transient Voltages. The source of the energizing voltage for the coding circuit within the IFF transponder shall be such that the open-circuit voltage on the control leads will not exceed 15 volts. Transient protection on this source voltage shall be provided so that, irrespective of the transients that might appear on the input power leads to the IFF transponder, the peak inverse voltage on the control leads will not exceed 15 volts.

3.2.1.6 Diversity performance. The equipment shall include necessary circuits for the purpose of distinguishing which channel, upper, or lower, should be used for transmitting replies provided the difference in time between the received signal at the input to the two receivers is equal to or less than 0.2 microseconds. Provision shall be made to allow replies to SIF interrogations on the antenna receiving the SIF interrogations between the Mode 4 interrogation and the Mode 4 reply. Provisions shall also be made for replying to the Mode 4 interrogations on the same antenna on which the Mode 4 interrogations were received in the presence of interlaced SIF interrogations.

3.2.1.6.1 Diversity operation. When Modes 1, 2, 3/A, C or 4 interrogations are being received, the diversity network shall sense which of the dual receivers is receiving the strongest signal. The diversity network shall incorporate the necessary switching to route the reply transmission to the antenna terminal associated with the strongest received signal. When the received signals are less than 3 dB apart, the diversity network shall route the transmitter output to either antenna. Diversity operation shall be maintained at the ratio stated over the dynamic signal range of 50 dB above to minimum triggering level.

3.2.1.6.2 Receiver isolation. The isolation between the two receiver channels shall be a minimum of 20 dB at 1030 MHz.

3.2.1.6.3 Receiver-transmitter delay. The delay between the second pulse of the radio-frequency interrogation pulse pair of nominal pulse spacing received at either antenna receptacle and the first transmitted radio-frequency reply pulse appearing at the same receptacle shall be 3 ±0.5 microseconds for Modes 1, 2, 3/A and C of operation. Delay variations between modes shall not exceed 0.2 microsecond for nominal spaced interrogations. The delay between the fourth pulse of a Mode 4 interrogation received at either antenna receptacle and the first transmitted radio-frequency reply pulse appearing at the same receptacle, excluding the delay of the Mode 4 computer, shall not be less than 2.0 microseconds nor more than 3.0 microseconds.

3.2.1.6.4 SIF reply channel decision. The reply channel decision shall be made within the duration of the last received pulse resulting in an SIF decode. The decision shall be stored for the duration of the resulting reply. The reply channel decision shall be capable of being renewed within 5.0 microseconds after the last transmitted pulse.

3.2.1.6.5 Mode 4 reply channel decision. The Mode 4 reply channel decision shall be made within the duration of the last received pulse resulting in a Mode 4 sync pattern decode. Storage (separate from that provided for SIF) shall be provided to store the Mode 4 decision for the duration of the resulting Mode 4 reply or until receipt of a Mode 4 disparity. The reply channel decision shall be capable of being renewed within 5.0 microseconds after the last transmitted pulse of the Mode 4 reply and within 2.0 microseconds after receipt of a Mode 4 disparity.

3.2.1.6.6 Mode 4 interrogation video switching. Following a Mode 4 reply channel decision, only interrogation video from the selected reply channel shall be routed to the KIT-1A/TSEC.

3.2.1.6.7 Operation during interlaced interrogations. During the interval between Mode 4 decodes and the resulting Mode 4 reply, the SIF reply channel decision storage shall function to provide diversity operation on appropriate SIF decodes. When the Mode 4 reply is received however, the Mode 4 decision storage shall override any SIF decision which was in use. Further, any SIF reply train which was in process shall be terminated (3.2.1.1.14.3).

3.2.1.6.8 Antenna Switching Override. Provisions shall be included to override automatic antenna switching and permit manual antenna channel selection. When one of two external control leads is grounded, the receiver-transmitter shall reply only on the upper antenna channel. When that control lead is ungrounded and the other control lead is grounded, the receiver-transmitter shall reply only on the lower antenna channel. When the upper antenna channel is selected, the decoder shall process only signals that are received in the upper channel and ignore those received in the lower channel. When the lower antenna channel is selected, the decoder shall process only signals received in the lower channel and ignore those received in the upper channel. The other requirements under Paragraph 3.2.1.6 shall apply with both control leads ungrounded.

3.2.1.7 Transmitter.

3.2.1.7.1 Frequency. The transmitter shall operate at 1090 MHz.

3.2.1.7.2 Frequency stability. The transmitter frequency shall remain within 3 MHz of the selected frequency for all combinations of specified service conditions, mismatch conditions, and over the input voltage range.

3.2.1.7.3 Frequency adjustment. The frequency of the transmitter shall be adjustable over a frequency range sufficient to provide for fundamental oscillator replacement.

3.2.1.7.4 Power output. With the transmitter output consisting of any combination of reply pulses having a nominal pulse width with a duty cycle of 0.2 percent, the transmitter shall deliver as close to 27 dB above 1 watt as practicable but not less than 25 dB above 1 watt nor more than 30 dB above 1 watt into a 51-ohm resistive load at the antenna terminal of the equipment. When the duty cycle is increased to 1 percent, under normal inspection test conditions the power output shall not be reduced to less than 25 dB above 1 watt. At a duty cycle of 0.2 percent, the power output shall not be reduced to less than 25 dB above 1 watt under any combination of specified service conditions. At a duty cycle of.1 percent, the power output shall not be reduced to less than 24 dB above 1 watt under any combination of specified service conditions. The peak power of any pulse in a group of pulses, shall not differ from any other output pulse of that group by more than 1 dB. The above requirements shall apply under mismatch conditions and over the input voltage range. The power output from one antenna terminal when active shall not differ by more than 1 dB from that from the other antenna terminal when active. The power output from one antenna terminal when inactive shall be at least 20 dB below that from the other antenna terminal when active.

3.2.1.7.5 Duty cycle. The transmitter shall be capable of a continuous 1.0 percent duty cycle operation with power output as specified herein. Circuitry shall be provided to protect the transmitter when this duty cycle is exceeded.

3.2.1.7.6 Output pulse. For each pulse generated by the coder, the transmitter shall generate an rf output pulse.

3.2.1.7.7 Capacity. The transmitter shall be capable of transmitting 0.45 ± 0.1 microsecond pulses meeting the requirements in a series of reply pulse groups having the following characteristics:

a. Number of pulses per group: 14 maximum, with spacing of 1.45 microseconds between consecutive pulses followed by 3 sets of framing pulses

b. Duration of each pulse group: 94.25 microseconds

3.2.1.7.8 Auxiliary trigger operations. An input connection shall be provided for application of auxiliary triggers to this equipment. An rf pulse shall be generated for each trigger input.

3.2.1.7.9 Receiver-transmitter range jitter. The maximum range jitter in any one antenna channel of the receiver-transmitter shall not exceed 0.1 microseconds. In addition the difference between the earliest signal reply time on any one antenna channel and the latest signal reply time on the other antenna channel shall be no greater than 0.2 microseconds under the most severe combination of the following simultaneous conditions:

a. Decodable signals on the same mode within 3 dB of each other received on two antenna channels.

b. Decodable signals on the same mode received on both antenna channels from 3 dB to 50 dB above MTL.

3.2.1.7.10 Mismatch. Anticipated service conditions of impedance mismatch shall include all values of load impedance that present a voltage standing wave ratio (VSWR) up to and including 1.8:1 at the antenna terminal of the receiver-transmitter unit with the incident and reflected waves coincident over at least 98 percent of their duration. The transmitter shall be capable of being operated without damage to the transponder when the antenna is disconnected.

3.2.1.8 Useful life. The equipment shall have a life of 10 years.

3.2.1.8.1 Operational service life. The equipment shall have an operational service life of not less than 10,000 hours. Operational service life is defined as the total operating time between the start of operation and wearout.

3.2.1.9 Built-in test. The Transponder Receiver-Transmitter shall detect 90 percent of all failures or out-of-tolerance conditions for the mode in use in the Transponder, and shall isolate 90 percent of the detected faults to the faulty LRU.

3.2.1.9.1 In-flight test. The IFF Transponder self test function shall provide self-generated rf interrogation pulses upon activation of the modes 1, 2, 3/A or C test enable lines. Receiver frequency and decoding drifts shall be assumed to contribute to shifts of the specified receiver sensitivity. The presence of a transmitted reply from the transmitter resulting from an interrogation by the test circuits will suffice as go, no-go check of receiver tuning, sensitivity, and decoding. Transmitter frequency and peak-power output shall be measured independently.

3.2.1.9.1.1 Integrator. The self test function shall not cause a go indication when the IFF Transponder reply rate is less than 50 percent of the internal interrogation rate. The equipment shall cause a go indication when the IFF Transponder reply rate is more than 80 percent of the internal interrogation rate.

3.2.1.9.1.2 Evaluation of replies during in-flight testing. When the self test function is soliciting a IFF Transponder reply, the equipment shall evaluate only those replies resulting from the self-generated interrogation pulse pairs. Replies resulting from external interrogations may occur, but shall have no effect on the evaluation.

3.2.1.9.1.3 Interrogation level. The interrogation level injected into the receiver shall be -71 dBm ± 3 dBm.

3.2.1.9.1.4 Interrogation frequency. The interrogation frequency of the test signal shall be 1030 ± 0.5 MHz under all specified service conditions.

3.2.1.9.1.5 Interrogation code. The self test function shall provide rf interrogation pulse pairs simulating Modes 1, 2, 3/A, and C interrogation signals. The mode of operation shall be selected by placing a ground on the respective mode-enabling control lead. The rf interrogation pulses shall have the following characteristics:

Interrogation code spacing:

Mode	Interrogation Code
1	2 pulses spaced 3.0 ± 0.1 microsecond
2	2 pulses spaced 5.0 ± 0.1 microsecond
3/A	2 pulses spaced 8.0 ± 0.1 microsecond
C	2 pulses spaced 21.0 ± 0.1 microsecond

3.2.1.9.1.6 Interrogation rate. The interrogation rate shall be 350 ± 85 interrogations per second applied to both channels simultaneously. The receiver channels are sampled alternately during test thereby effectively testing each channel at 175 interrogations per second.

3.2.1.9.1.7 Reply frequency discrimination. The self test function shall determine that the transmitter reply frequency is within acceptable limits over the range of input peak power levels. The reply frequency variations required for go, no-go indications shall be as follows:

a. A variation that is less than 3.0 MHz from 1090 MHz will make a go indication possible.

b. A variation that is more than 4.0 MHz from 1090 MHz will cause a no-go indication.

3.2.1.9.1.8 Bracket pulse spacing. The self test function shall determine that the transponder bracket pulse spacing is within acceptable limits. The bracket pulse spacings required for go, no-go indications shall be as follows:

a. A variation that is less than ±0.15 microsecconds from 20.3 microseconds will make a go indication possible.

b. A variation that is more than ±0.3 microsecond from 20.3 microseconds will cause a no-go indication.

3.2.1.9.1.9 Transmitter reply peak pulse power. The self test function shall determine that the transmitter framing pulse peak rf power level is above an acceptable limit. The acceptable level shall be not less than 21 dB above 1 watt.

3.2.1.9.1.10 Antenna system check. Means shall be provided to check the transponder antenna system performance including the transmission line. The limits specified in "a" and "b" below apply for all rf phase angles through 360° since the rf phasing is unpredictable and uncontrollable in an installation. An indication of the VSWR characteristics of the transmission line shall be given as follows:

a. A sustained VSWR 1.8:1 or less shall make a go indication possible.

b. A sustained VSWR of 2.5:1 or greater shall cause a NO-GO indication.

3.2.1.9.2 Monitoring. When functioning as a monitoring device, the self test shall indicate transponder performance by detecting Transponder replies that are generated as a result of external interrogation signals. In this mode of operation, a no-go indication will be given when any one of the respective pulse characteristics specified in 3.2.1.9.1.7, 8, 9 or 10 for a no-go condition is met. If the external interrogation signal is a mode 4 interrogation, the bracket pulse spacing check in 3.2.1.9.1.8 shall be bypassed.

3.2.1.9.2.1 Reply evaluator. When monitoring replies to external signals, a go indication shall be possible when 10 or more replies are generated at a rate of at least 100 replies per second . A no-go indication shall be given when 5 or less replies are generated at the above rate. When the transponder is receiving valid interrogations at less than the above rate the above conditions do not apply.

3.2.1.9.3 Control functions.

a. Remote control of the test circuit shall be initiated from the Transponder control panel. It shall be possible to perform mode testing as specified in "1" through "4". (Only one test mode shall be enabled at one time.)

1. Mode 1 test: By grounding Mode 1 test enable control lead

2. Mode 2 test: By grounding Mode 2 test enable control lead

3. Mode 3/A test: By grounding Mode 3/A test enable control lead

4. Mode C test: By grounding Mode C test enable control lead

3.2.1.10 Monitor/Test light enable. (For C-6280 operation only) To enable the Monitor/Test light (Located on the C-6280(P)/APX Control) when replies are within the limits specified herein for satisfactory performance, connector pin. The duration of the lamp excitation voltage shall be at least 2 seconds and reset automatically during transponder monitoring operation.

3.2.1.11 Lamp power characteristics. (For C-6280 operation only) The +28 volts DC power supplied to the Mode 4 caution, Mode 4 reply light and the Monitor/Test light shall have the characteristics of +28 volts DC input to the transponder and shall not be fused in the transponder.

3.2.1.12 Warm-Up Time. Warm-up time shall not exceed 5 minutes for temperatures between -54°C and -40°C, and 2 minutes for temperatures above -40°C.

3.2.2 Physical characteristics.

3.2.2.1 Weight and size. The weight of the equipment shall not exceed 14.3 lbs. The size of the equipment shall be in accordance with Teledyne Electronics drawing 137755.

3.2.3 Reliability. The equipment shall have a specified Mean-Time-Between-Failures (MTBF) of 500 hours, θ_o, as defined in MIL-STD-781. The minimum acceptable MTBF shall be based upon a discrimination ratio of 2.0 and a confidence level of 90 percent.

3.2.4 Maintainability.

3.2.4.1 Unscheduled maintenance. The mean elapsed downtime for unscheduled maintenance shall not exceed the following:

Organization Level	0.80 hours
Intermediate Level	1.58 hours

3.2.4.2 Scheduled maintenance. The allocated mean elapsed downtime for scheduled maintenance shall not exceed the following:

Preflight	0.03 hours

3.2.5 Environmental conditions. The equipment shall meet all specified operating requirements and shall provide required performance, life and reliability when subjected to the following environmental conditions.

3.2.5.1 Shock. The equipment shall meet the service and crash safety shock requirements of MIL-STD-810B.

3.2.5.2 Design loads. The item when installed in the aircraft shall be designed in accordance with the following loads criteria. Limit loads are defined as those loads that are actually expected to be experienced when operating within the performance envelope of the aircraft.

3.2.5.2.1 Limit Load Factors - The equipment shall have no distortion or permanent set and shall meet the performance requirements specified herein, when subjected to the following limit load conditions.

Vertical - +7.33, -4.0 (+ Vertical load factors act down)

Longitudinal - +1.0, -11.5 (+ Longitudinal load factor act aft)

Lateral - ±2.0 (+Lateral load factors act toward right side).

3.2.5.2.2 Ultimate loads. Ultimate loads are 1.5 times limit loads. There shall be no structural failures when the item is subjected to ultimate loads. However, distortion and permanent set are permissible after the application of ultimate loads. Operation of the item is not required during or after the application of ultimate loads.

3.2.5.2.3 Crash loads. Not applicable.

3.2.5.3 Vibration - The equipment shall meet the vibration test requirements of Appendix I.

3.2.5.4 Acoustic noise. The equipment shall meet the requirements of MIL-STD-810B, Method 515, Category A, Figure 515-2.

3.2.5.5 Temperature-altitude. The equipment shall meet the temperature - altitude test requirements of Appendix II.

3.2.5.6 Explosive atmosphere. The requirements of 3.2.24.10 of MIL-E-5400 are applicable.

3.2.5.7 Humidity. The requirements of 3.2.24.4 of MIL-E-5400 are applicable.

3.2.5.8 Salt atmosphere. The requirements of 3.2.24.9 of MIL-E-5400 are applicable.

3.2.5.9 Fungus. The requirements of 3.2.24.8 of MIL-E-5400 are applicable.

3.2.5.10 Sand and dust. The requirements of 3.2.24.7 of MIL-E-5400 are applicable.

3.3 Design and construction. Unless otherwise specified herein, the design and construction of the equipment shall conform to MIL-E-5400.

3.3.1 Electromagnetic Interference and Compatibility. The equipment shall comply with MIL-STD-461 with the following changes and additions. Requirements CEO3, CEO4, CEO6, CSO1, CSO2, CS03, CS04, CSO5, CSO6, CSO7, REO2, REO3, RSO2, and RSO3 of MIL-STD-462 shall apply except that the 1 volt/meter requirement of RSO3 is changed to 20 volts/meter.

3.3.2 Elapsed time meter. The equipment shall include a digital, non-resettable 9999 hour elapsed time meter conforming to MIL-M-7793 which will indicate unit "on" time. The meter shall be located so that it may be easily read with the unit normally mounted in the air vehicle without removing a cover from the unit.

3.4 Major components characteristics. This section not applicable to this specification.

3.5 Precedence. In the event of a conflict of documents, the following order of precedence shall apply:

a. 1st - Contract

b. 2nd - This Specification

The order and selection of specifications and standards shall be in accordance with MIL-STD-143.

3.6 Nameplates and Product Marking.

3.6.1 Marking of Parts and Assemblies. Parts and assemblies shall be marked in accordance with 3.1.16 of MIL-E-5400 except as noted herein.

3.6.2 Identification of Units. A nameplate conforming to the requirements of MIL-STD-130 shall be permenently attached to the equipment.

3.7 Workmanship. Workmanship shall conform with the requirements of Paragraph 3.5 of MIL-E-5400.

3.8 Interchangeability. Interchangeability shall conform with Paragraph 3.3. of MIL-E-5400. All parts, subassemblies, assemblies, units, etc., having the same manufacturers part number shall be directly and completely interchangeable with each other with respect to installation and performance. Changes in manufactuerers part number shall be governed by the requirements of MIL-STD-100, Paragraphs 1-302.14 and 1-302.15. Changes of AN designations shall be governed by MIL-N-7513.

3.9 Safety. To assure optimum safety, the equipment shall meet the safety requirements of AFSC DH 1-6, MIL-STD-882 and Paragraph 3.2.22 of MIL-E-5400.

3.10 Processes.

3.10.1 Finish and Colors. The equipment and parts thereof shall be finished in accordance with MIL-E-5400. Colors for the finish applied to parts and equipment shall comply with MIL-E-5400.

4. QUALITY ASSURANCE PROVISIONS

4.1 General. This section outlines methods of verification of equipment performance and design requirements. Testing shall be performed in timely fashion to assist in development of the process, materials, and items covered by this specification.

a. Verification methods are as follows:

(1) Inspection. Visual and dimensional checks. One or both may be necessary to verify a requirement.

(2) Review of analytical data. Review of previous test data and any theoretical analysis that may be required.

(3) Demonstration. Fit and function check; usually of a go-no-go nature which requires no instrumentation.

(4) Test. Examination or trial which yields analytical data; normally requires instrumentation.

b. Test categories and functional test classifications are defined as follows:

Category I. Development test and evaluation. Includes all ground and flight testing other than that accomplished during Categories II and III. Consists of development testing of individual components, subsystems, and configuration items. Testing in Category I is subdivided into the following broad types as dictated by the test objective.

(1) Engineering test and evaluation. Performed to acquire data to develop the production designs. These tests shall be conducted using preliminary models and prototype parts or assemblies. Data generated during the progress of tests that are to be recognized as formal verification of Section 3 requirements shall be so stated in the test objective.

(2) Formal qualification. Performed on components, subsystems, and the configuration item to formally demonstrate compliance with performance and design requirements.

(3) Reliability analysis and tests. Tests conducted to acquire reliability data in support of reliability analysis.

Category II. System development test and evaluation. Covers testing and evaluation spanning the integration of subsystems into a complete system, and development tests of the completed system in as near an operational environment and configuration as practicable.

4.1.1 Responsibility for tests. The contractor may utilize his own facilities or any other inspection facilities and services acceptable to the Government. Records of the examinations and tests shall be kept complete and available to the Government as specified in the contract. The Government reserves the right to perform any of the tests set forth in this specification where such tests are deemed necessary to assure that the configuration item conforms to prescribed requirements. Test category responsibility shall be assigned as follows:

a. Category I. This testing shall be conducted by the contractor with the USAF participation as required.

b. Category II. This testing will be conducted by the USAF with contractor support.

4.2 Quality conformance inspections.
4.2.1 Category I
4.2.1.1 Formal qualification. The following inspections, analysis, demonstrations, or tests shall be performed by (or for) the equipment manufacturer. The successful completion of these verifications shall constitute full qualification of the equipment to this specification. Section 3 paragraphs to be verified are designated below by both paragraph name and number.

4.2.1.1.1 Formal qualification-inspection. The following paragraphs of this specification shall be verified by inspection:

Receiver (3.2.1.1)
Design and construction (3.3)
Elapsed time meter (3.3.2)
Marking of parts and assemblies (3.6.1)
Identification of units (3.6.2)
Workmanship (3.7)
Interchangeability (3.8)
Safety (3.9)
Finish and colors (3.10.1)

4.2.1.1.2 Formal qualification-analysis. The following paragraphs of this specification shall be verified by analysis:

Useful life (3.2.1.8)
Operational service life (3.2.1.8.1)
Fungus (3.2.5.9)

4.2.1.1.3 Formal qualification - demonstration. The following paragraphs of this specification shall be verified by demonstration:

Thermal design (3.1.2.2.2).
Sensitivity level selection (3.2.1.1.3.3).
Decoding performance (3.2.1.2).
Coder control (3.2.1.3.1).
Coder output pulse selection (3.2.1.3.10).
Mode 1 (3.2.1.3.11.1).
Mode 2 (3.2.1.3.11.2)
Mode 3/A (3.2.1.3.11.3).
Mode C (3.2.1.3.11.4).
Mode C (3.2.1.5).
Diversity performance (3.2.1.6).
Frequency adjustment (3.2.1.7.3).

4.2.1.1.4 Formal qualification - test. The following paragraphs of this specification shall be verified by test:

4.2.1.1.4.1 Performance test under standard conditions. The equipment shall be subjected to performance tests under the standard conditions specified in MIL-STD-810.

The following requirements shall be verified using the standard test set up shown in Figure 3 herein (or its equivalent); except that actual interfacing equipment shall be used for the compatibility test.

Service conditions - electrical (3.1.2.2.3).
Switched primary power (3.1.2.2.3.1).
Compatibility (3.1.2.2.4).
Frequency (3.2.1.1.1).
Frequency stability (3.2.1.1.2).
Sensitivity (MTL) (3.2.1.1.3).
Normal sensitivity (3.2.1.1.3.1).
Low sensitivity (3.2.1.1.3.2).
Sensitivity stability (3.2.1.1.4).
Random trigger rate (3.2.1.1.5).
Bandwidth (3.2.1.1.6).
Spurious response (3.2.1.1.7).
Friendly interference (3.2.1.1.8).
Suppressor input operation (3.2.1.1.9).
Suppressor output (3.2.1.1.10).
Decoder suppression (3.2.1.1.10.1).
Echo rejection (3.2.1.1.11).

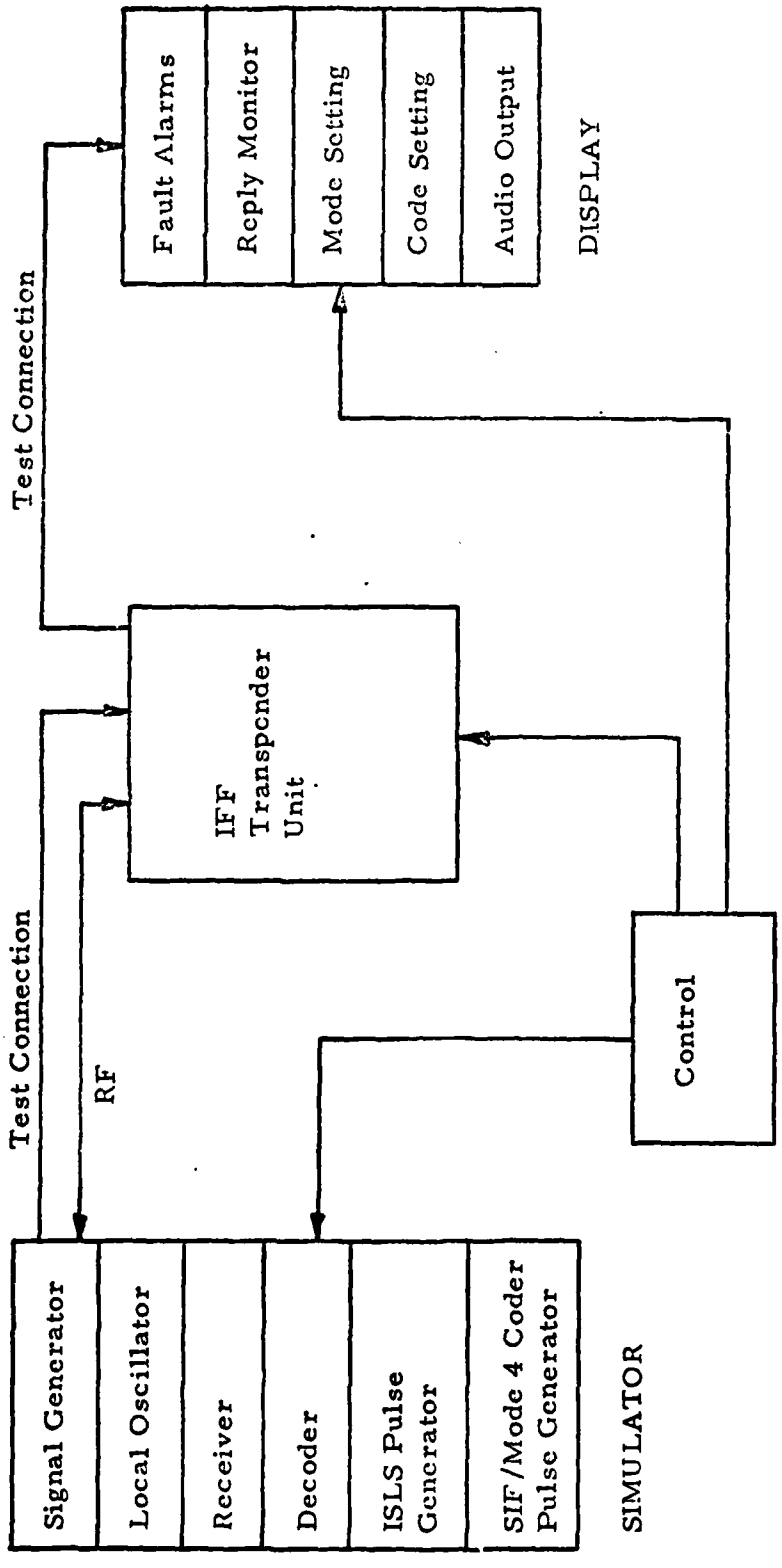


Figure 3. Test Set Up

SIF desensitization (3.2.1.1.11.1).
Mode 4 desensitization (3.2.1.1.11.2).
ISLS control pulse characteristics (3.2.1.1.12.1).
Suppression (3.2.1.1.12.2).
Non-suppression (3.2.1.1.12.3).
Gray region (3.2.1.1.12.4).
ISLS dynamic range (3.2.1.1.12.5).
Sidelobe suppression rate limiter (3.2.1.1.12.6).
Pulse width discrimination (3.2.1.1.13).
Internal suppression (3.2.1.1.14).
Suppression during Mode 4 interrogation (3.2.1.1.14.1).
Suppression during transmission of Mode 1, 2, 3/A and C replies (3.2.1.1.14.2).
Suppression during transmission of Mode 4 replies (3.2.1.1.14.3).
Decoder, mode-1 (3.2.1.2.1).
Decoder, mode-2 (3.2.1.2.2).
Decoder, mode-3/A (3.2.1.2.3).
Decoder, mode-4 (3.2.1.2.4).
Decoder, mode C (3.2.1.2.5).
Single pulse decoding (3.2.1.2.6).
Automatic overload control (3.2.1.2.7).
Rate limit adjustment (3.2.1.2.7.1).
Action time (3.2.1.2.7.2).
Coder (3.2.1.3).
Standby (3.2.1.3.2).
Coder, mode 1 (3.2.1.3.3).
Coder, mode 2 (3.2.1.3.4).
Coder, mode 3/A (3.2.1.3.5).
Coder mode C (3.2.1.3.6).
Output pulse characteristics (3.2.1.3.7).
Emergency response provisions (3.2.1.3.8).
Identification of position I/P (3.2.1.3.9).
Mode 4 reply input (3.2.1.4.1.1).
Mode 4 disparity pulse input (3.2.1.4.1.2).
Mode 4 trigger (3.2.1.4.2.1).
Mode 4 video (3.2.1.4.2.2).
Mode 4 reply light enable (3.2.1.4.2.3).
Caution light enable (3.2.1.4.2.4).
Audio output (3.2.1.4.2.5).
Mode 4 CDL (3.2.1.4.2.6).
Mode C input (3.2.1.5.1).
Noise filtering on Mode C control leads (3.2.1.5.2)
Source and transient voltages (3.2.1.5.3)
Diversity operation (3.2.1.6.1)
Receiver isolation (3.2.1.6.2)
Receiver transmitter delay (3.2.1.6.3)
SIF reply channel decision (3.2.1.6.4)

Mode 4 reply channel decision (3.2.1.6.5).
Mode 4 interrogation video switching (3.2.1.6.6).
Operation during interlaced interrogations (3.2.1.6.7).
Antenna switching override (3.2.1.6.8).
Frequency (3.2.1.7.1).
Frequency stability (3.2.1.7.2).
Power output (3.2.1.7.4).
Duty cycle (3.2.1.7.5).
Output pulse (3.2.1.7.6).
Capacity (3.2.1.7.7).
Auxiliary trigger operations (3.2.1.7.8).
Receiver-transmitter range jitter (3.?.1.7.9).
Mismatch (3.2.1.7.10).
Built-In-Test (3.2.1.9).
In-flight test (3.2.1.9.1).
Integrator (3.2.1.9.1.1).
Evaluation of replies during in-flight testing (3.2.1.9.1.2).
Interrogation level (3.2.1.9.1.3).
Interrogation frequency (3.2.1.9.1.4).
Interrogation code (3.2.1.9.1.5).
Interrogation rate (3.2.1.9.1.6).
Reply frequency discrimination (3.2.1.9.1.7).
Bracket pulse spacing (3.2.1.9,1.8).
Transmitter reply peak pulse power (3.2.1.9.1.9).
Antenna system check (3.2.1.9.1.10).
Monitoring (3.2.1.9.2).
Reply evaluator (3.2.1.9.2.1).
Control functions (3.2.1.9.3).
Monitor/Test light enable (3.2.1.10).
Lamp power characteristics (3.2.1.11).

4.2.1.1.4.2 Performance test under simulated environmental conditions.

a. The verification of the following paragraphs shall be in accordance with MIL-STD-810.

Explosive atmosphere (3.2.5.6)
Humidity (3.2.5.7)
Salt atmosphere (3.2.5.8)
Sand and dust (3.2.5.10)
Shock (3.2.5.1)
Acoustic Noise (3.2.5.4)

b. The verification of the following paragraphs shall be in accordance with Appendix I.

Vibration (3.2.5.3)

c. The verification of the following paragraphs shall be in accordance with Appendix II.

Temperature - Altitude (3.2.5.5)

d. The verification of the following paragraph shall be in accordance with the following:

Design Loads (3.2.5.2). Performance tests under normal operating loads are necessary to demonstrate the functional integrity of the equipment. Limit and ultimate load tests are necessary to demonstrate the structural integrity of the equipment and mounting consistent with the design requirements. These tests shall be conducted with the equipment mounted in a manner simulating the installation, the mounting hardware shall be the same as used in the aircraft, and shock mounts shall be in place if normally used. For ultimate load factor tests, the mounting system and the unit case shall be complete, but internal components in the case may be simulated by mass items giving the same weight, and center of gravity as the equipment.

Normal Operating and Limit Load Factors (3.2.5.2.1). The equipment while mounted as in the aircraft shall satsifactorily demonstrate that it meets performance requirements of this specification, both during and after application of limit loads of paragraph 3.2.5.2.1 herein. No physical distortion or permanent set is permitted after application of limit load. A centrifuge or an equivalent method shall be used to produce the required load factors for these tests.

Ultimate Load Factors (3.2.5.2.2). Subject the equipment (or case and dummy load) and mounts to ultimate loads and the equipment shall then be examined for mechanical failure. Bending and distortion are permitted; however, there shall be no failure of the attaching points and the equipment (or case and dummy load) shall remain in place. A centrifuge or an equivalent method shall be used to produce the required load factors for these tests.

4.2.1.2 Reliability qualification tests (3.2.3). The reliability requirements of 3.2.3 herein shall be verified by reliability tests to be conducted at the equipment manufacturers facilities. At least 2 preproduction samples of the equipment to be supplied under the contract shall be tested in accordance with the requirements of MIL-STD-781, Test Plan III. The tests shall be conducted in accordance with Test Level F, utilizing the standard method of temperature cycling per 5.2.3.1, MIL-STD-781, with the equipment stabilized at the upper level temperature for 2 hours. Input voltage cycling shall be in accordance with

5.2.5, MIL-STD-781 except that the voltage limits shall be as specified in MIL-STD-704 for Category B equipment with normal steady state limits for both ac and dc voltages. Equipment operation during this testing including time phased apportionment of modes of operation shall simulate service usage. The equipment shall be cycled operationally during the "ON" portion of the temperature cycle. The performance parameters to be monitored during the reliability testing shall be adequate to demonstrate as a minimum, the satisfactory functional operation of the equipment under test. These parameters shall be specified in the detailed reliability test procedure which is subject to Air Force review and approval. The temperature cycling, equipment on-off cycling and input voltage cycling, coupled with 10 minutes of vibration out of every hour of operating time shall be continued for the duration of the test. The period of vibration shall start within 15 minutes after the start of the equipment "ON" cycle. The accept-reject criteria shall be in accordance with the criteria of 4.2.8.3 of MIL-STD-781. Minimum test time on each equipment shall not be less than one MTBF. Only equipment "ON" time is to be used in computing the required total test time. All pattern failures as defined in MIL-STD-781, shall be corrected regardless of the outcome of the test. The detailed requirements of Section 5, MIL-STD-781 shall apply. In the event a reject decision is approached, the contractor may elect to stop the test, incorporate corrective action into the units under test, and rerun or continue the reliability test until an accept decision is reached. In the event a reject decision is reached, the test shall be immediately stopped, corrective action incorporated into the units under test, and the test rerun to demonstrate that an accept decision has been reached. Subsequent to the successful completion of the test, all equipment produced under the contract shall be modified to the configuration passing the reliability test.

4.2.1.3 Electromagnetic interference and compatibility (3.3.1). The equipment shall be tested in compliance with MIL-STD-462 to assure compliance with the requirements of MIL-STD-461 except that the 1 volt/meter requirement of RS03 is changed to 20 volts/meter.

4.2.2 Production acceptance reliability test. Production acceptance reliability tests shall be performed in accordance with a test procedure which shall be approved by the Procuring Activity prior to the start of Acceptance Testing.

5. PREPARATION FOR DELIVERY.

This section not applicable to this specification.

6.0 NOTES.

This section not applicable to this specification.

TABLE II

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX

Section 3 Requirement Reference		N/A	Verification Method: Insp	Analysis	Demo	Test	ETBE	Test Category 1: Prequal	Qual	Rel	Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
3.	REQUIREMENTS	X										
3.1	Item definition	X										
3.1.1	Item diagram	X										
3.1.2	Interface definition	X										
3.1.2.1	Functional interface	X										
3.1.2.1.1	Interface signal characteristics	X										
3.1.2.2	Physical interface	X										
3.1.2.2.1	Installation	X										
3.1.2.2.2	Thermal design				X				X		4.2.1.1.3	
3.1.2.2.3	Service conditions-electrical					X			X		4.2.1.1.4.1	
3.1.2.2.3.1	Switched primary-power					X			X		4.2.1.1.4.1	
3.1.2.2.4	Compatibility					X			X		4.2.1.1.4.1	
3.1.3	Major component list	X										
3.1.4	Government furnished property list	X										
3.1.5	Government loaned property list	X										
3.2	Characteristics	X										
3.2.1	Performance	X										
3.2.1.1	Receiver		X						X		4.2.1.1.1	
3.2.1.1.1	Frequency					X			X		4.2.1.1.4.1	
3.2.1.1.2	Frequency stability					X			X		4.2.1.1.4.1	
3.2.1.1.3	Sensitivity (minimum triggering level MTL)					X			X		4.2.1.1.4.1	
3.2.1.1.3.1	Normal sensitivity					X			X		4.2.1.1.4.1	
3.2.1.1.3.2	Low sensitivity					X			X		4.2.1.1.4.1	
3.2.1.1.3.3	Sensitivity level				X				X		4.2.1.1.3	

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX												
Section 3 Requirement Reference		N/A	Verification Method					Test Category			Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
			Insp	Analysis	Demo	Test	ETBE	Prequal	Qual	Rel		
3.2.1.1.4	Sensitivity stability					X			X		4.2.1.1.4.1	
3.2.1.1.5	Random trigger rate					X			X		4.2.1.1.4.1	
3.2.1.1.6	Bandwidth					X			X		4.2.1.1.4.1	
3.2.1.1.7	Spurious responses					X			X		4.2.1.1.4.1	
3.2.1.1.8	Friendly interference					X			X		4.2.1.1.4.1	
3.2.1.1.9	Suppressor input operation					X			X		4.2.1.1.4.1	
3.2.1.1.10	Suppression output					X			X		4.2.1.1.4.1	
3.2.1.1.10.1	Decoder suppression					X			X		4.2.1.1.4.1	
3.2.1.1.11	Echo rejection					X			X		4.2.1.1.4.1	
3.2.1.1.11.1	SIF desensitization					X			X		4.2.1.1.4.1	
3.2.1.1.11.2	Mode 4 desensitization					X			X		4.2.1.1.4.1	
3.2.1.1.12	Interrogation side suppression (ISLS)	X										
3.2.1.1.12.1	ISLS control pulse characteristics					X			X		4.2.1.1.4.1	
3.2.1.1.12.2	Suppression					X			X		4.2.1.1.4.1	
3.2.1.1.12.3	Nonsuppression					X			X		4.2.1.1.4.1	
3.2.1.1.12.4	Gray region					X			X		4.2.1.1.4.1	
3.2.1.1.12.5	ISLS dynamic range					X			X		4.2.1.1.4.1	
3.2.1.1.12.6	ISLS rate limiter					X			X		4.2.1.1.4.1	
3.2.1.1.13	Pulse width discrimination					X			X		4.2.1.1.4.1	
3.2.1.1.14	Internal Suppression					X			X		4.2.1.1.4.1	

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX													
Section 3 Requirement Reference		N/A	Verification Method					Test Category			Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
			Insp	Analysis	Demo	Test	ETSE	Prequal	Qual	Rel		
3.2.1.1.14.1	Suppression during Mode 4 interrogation					X			X		4.2.1.1.4.1	
3.2.1.1.14.2	Suppression of any mode during transmission of SIF replies					X			X		4.2.1.1.4.1	
3.2.1.1.14.3	Suppression during transmission of Mode 4 replies					X			X		4.2.1.1.4.1	
3.2.1.2	Decoding performance				X				X		4.2.1.1.3	
3.2.1.2.1	Decoder, Mode 1					X			X		4.2.1.1.4.1	
3.2.1.2.2	Decoder, Mode 2					X			X		4.2.1.1.4.1	
3.2.1.2.3	Decoder, Mode 3/A					X			X		4.2.1.1.4.1	
3.2.1.2.4	Decoder, Mode 4					X			X		4.2.1.1.4.1	
3.2.1.2.5	Decoder, Mode C					X			X		4.2.1.1.4.1	
3.2.1.2.6	Single pulse decoding					X			X		4.2.1.1.4.1	
3.2.1.2.7	Automatic overload control					X			X		4.2.1.1.4.1	
3.2.1.2.7.1	Rate limit adjustment					X			X		4.2.1.1.4.1	
3.2.1.2.7.2	Action time					X			X		4.2.1.1.4.1	
3.2.1.3	Coder					X			X		4.2.1.1.4.1	
3.2.1.3.1	Coder control				X				X		4.2.1.1.3	
3.2.1.3.2	Standby					X			X		4.2.1.1.4.1	
3.2.1.3.3	Coder, Mode 1					X			X		4.2.1.1.4.1	
3.2.1.3.4	Coder, Mode 2					X			X		4.2.1.1.4.1	
3.2.1.3.5	Coder, Mode 3/A					X			X		4.2.1.1.4.1	
3.2.1.3.6	Coder, Mode C					X			X		4.2.1.1.4.1	

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX													
Section 3 Requirement Reference		N/A	Verification Method				Test Category				Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
							I					
			Insp	Analysis	Demo	Test	ETSE	Prequal	Qual	Rel		
3.2.1.3.7	Output pulse characteristics					X			X		4.2.1.1.4.1	
3.2.1.3.8	Emergency response provisions					X			X		4.2.1.1.4.1	
3.2.1.3.9	Identification of position (I/P)					X			X		4.2.1.1.4.1	
3.2.1.3.10	Coder output pulse selection				X				X		4.2.1.1.3	
3.2.1.3.11	Code number assignments	X										
3.2.1.3.11.1	Mode 1				X				X		4.2.1.1.3	
3.2.1.3.11.2	Mode 2				X				X		4.2.1.1.3	
3.2.1.3.11.3	Mode 3/A				X				X		4.2.1.1.3	
3.2.1.3.11.4	Mode C				X				X		4.2.1.1.3	
3.2.1.4	Mode 4	X										
3.2.1.4.1	Mode 4 input signals	X										
3.2.1.4.1.1	Mode 4 reply input					X			X		4.2.1.1.4.1	
3.2.1.4.1.2	Mode 4 disparity pulse input					X			X		4.2.1.1.4.1	
3.2.1.4.2	Mode 4 output signals	X										
3.2.1.4.2.1	Mode 4 trigger					X			X		4.2.1.1.4.1	
3.2.1.4.2.2	Mode 4 video					X			X		4.2.1.1.4.1	
3.2.1.4.2.3	Mode 4 reply light enable					X			X		4.2.1.1.4.1	
3.2.1.4.2.4	Caution light enable					X			X		4.2.1.1.4.1	
3.2.1.4.2.5	Audio output					X			X		4.2.1.1.4.1	

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX													
Section 3 Requirement Reference		N/A	Verification Method				Test Category				Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
							I					
			Insp	Analysis	Demo	Test	ETØE	Prequal	Qual	Rel		
3.2.1.4.2.6	Mode 4 computer duty limiter (CDL)					X			X		4.2.1.1.4.1	
3.2.1.5	Mode C				X				X		4.2.1.1.3	
3.2.1.5.1	Mode C input					X			X		4.2.1.1.4.1	
3.2.1.5.2	Noise Filtering on Mode C control leads					X			X		4.2.1.1.4.1	
3.2.1.5.3	Source and Transient Voltages					X			X		4.2.1.1.4.1	
3.2.1.6	Diversity performance				X				X		4.2.1.1.3	
3.2.1.6.1	Diversity operation					X			X		4.2.1.1.4.1	
3.2.1.6.2	Receiver isolation					X			X		4.2.1.1.4.1	
3.2.1.6.3	Receiver-transmitter delay					X			X		4.2.1.1.4.1	
3.2.1.6.4	SIF reply channel decision					X			X		4.2.1.1.4.1	
3.2.1.6.5	Mode 4 reply channel decision					X			X		4.2.1.1.4.1	
3.2.1.6.6	Mode 4 interrogation video switching					X			X		4.2.1.1.4.1	
3.2.1.6.7	Operation during interlaced interrogations					X			X		4.2.1.1.4.1	
3.2.1.6.8	Antenna switching override					X			X		4.2.1.1.4.1	
3.2.1.7	Transmitter	X										
3.2.1.7.1	Frequency					X			X		4.2.1.1.4.1	
3.2.1.7.2	Frequency stability					X			X		4.2.1.1.4.1	
3.2.1.7.3	Frequency adjustment				X				X		4.2.1.1.3	
3.2.1.7.4	Power output					X			X		4.2.1.1.4.1	
3.2.1.7.5	Duty cycle					X			X		4.2.1.1.4.1	
3.2.1.7.6	Output pulse											

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX												
Section 3 Requirement Reference		N/A	Verification Method: Insp	Analysis	Demo	Test	ETSE	Test Category: Prequal	Qual	Rel	Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
3.2.1.7.7	Capacity					X			X		4.2.1.1.4.1	
3.2.1.7.8	Auxiliary trigger operation					X			X		4.2.1.1.4.1	
3.2.1.7.9	Receiver-transmitter range jitter					X			X		4.2.1.1.4.1	
3.2.1.7.10	Mismatch					X			X		4.2.1.1.4.1	
3.2.1.8	Useful life			X					X		4.2.1.1.2	
3.2.1.8.1	Operational service life			X					X		4.2.1.1.2	
3.2.1.9	Built-in test			X					X		4.2.1.1.2	
3.2.1.9.1	In-flight test					X			X		4.2.1.1.4.1	
3.2.1.9.1.1	Integrator					X			X		4.2.1.1.4.1	
3.2.1.9.1.2	Evaluation of replies during in-flight testing					X			X		4.2.1.1.4.1	
3.2.1.9.1.3	Interrogation level					X			X		4.2.1.1.4.1	
3.2.1.9.1.4	Interrogation frequency					X			X		4.2.1.1.4.1	
3.2.1.9.1.5	Interrogation code					X			X		4.2.1.1.4.1	
3.2.1.9.1.6	Interrogation rate					X			X		4.2.1.1.4.1	
3.2.1.9.1.7	Reply frequency discrimination					X			X		4.2.1.1.4.1	
3.2.1.9.1.8	Bracket pulse spacing					X			X		4.2.1.1.4.1	
3.2.1.9.1.9	Transmitter reply peak pulse power					X			X		4.2.1.1.4.1	
3.2.1.9.1.10	Antenna system check					X			X		4.2.1.1.4.1	
3.2.1.9.2	Monitoring					X			X		4.2.1.1.4.1	

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX

Section 3 Requirement Reference		N/A	Verification Method: Insp	Analysis	Demo	Test	Test Category I: ETBE	Prequal	Qual	Rel	Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
3.2.1.9.2.1	Reply evaluator					X			X		4.2.1.1.4.1	
3.2.1.9.3	Control functions					X			X		4.2.1.1.4.1	
3.2.1.10	Monitor/Test light enable					X			X		4.2.1.1.4.1	
3.2.1.11	Lamp power characteristics					X			X		4.2.1.1.4.1	
3.2.1.12	Warm-up Time					X			X		4.2.1.1.4.1	
3.2.2	Physical characteristics	X										
3.2.2.1	Weight and size	X										
3.2.3	Reliability					X				X	4.2.1.2	
3.2.4	Maintainability	X										
3.2.4.1	Unscheduled maintenance			X					X		4.2.1.1.2	
3.2.4.2	Scheduled maintenance			X					X		4.2.1.1.2	
3.2.5	Environmental conditions	X										
3.2.5.1	Shock					X			X		4.2.1.1.4.2c	
3.2.5.2	Design loads	X										
3.2.5.2.1	Limit load factors					X			X		4.2.1.1.4.2d	
3.2.5.2.2	Ultimate loads					X			X		4.2.1.1.4.2d	
3.2.5.2.3	Crash loads	X										
3.2.5.3	Vibration					X			X		4.2.1.1.4.2c	
3.2.5.4	Acoustic noise					X			X		4.2.1.1.4.2c	
3.2.5.5	Temperature-altitude					X			X		4.2.1.1.4.2b	
3.2.5.6	Explosive atmosphere					X			X		4.2.1.1.4.2a	

TABLE II (Cont)

SPECIFICATION REQUIREMENT/VERIFICATION CROSS-REFERENCE INDEX

Section 3 Requirement Reference		N/A	Verification Method: Insp	Analysis	Demo	Test	Test Category I: ETBE	Prequal	Qual	Rel	Verification Requirement Specification/Paragraph	Test Information Sheet (Reference)
3.2.5.7	Humidity					X			X		4.2.1.1.4.2a	
3.2.5.8	Salt atmosphere					X			X		4.2.1.1.4.2a	
3.2.5.9	Fungus			X					X		4.2.1.1.2	
3.2.5.10	Sand and dust					X			X		4.2.1.1.4.2a	
3.3	Design and construction		X						X		4.2.1.1.1	
3.3.1	Electromagnetic interference and compatibility					X			X		4.2.1.3	
3.3.2	Elapsed time meter		X						X		4.2.1.1.1	
3.4	Major component characteristics	X										
3.5	Precedence	X										
3.6	Nameplates and Product Marking	X										
3.6.1	Marking of Parts and Assemblies		X						X		4.2.1.1.1	
3.6.2	Identification of Units		X						X		4.2.1.1.1	
3.7	Workmanship		X						X		4.2.1.1.1	
3.8	Interchangeability		X						X		4.2.1.1.1	
3.9	Safety		X						X		4.2.1.1.1	
3.10	Processes	X										
3.10.1	Finish and Colors		X						X		4.2.1.1.1	

APPENDIX I

APPENDIX I

10. VIBRATION TEST REQUIREMENT

10.1 Equipment Random Testing (equipment normally mounted). In this procedure, a random vibration test is substituted for the sinusoidal vibration test for frequencies above 50 Hz. In the frequency range of 5 to 50 Hz, the sinusoidal vibration level of Figure I-1 shall be applied. The random spectral shape and vibration levels and test times are given in Figure I-2 The instantaneous random vibration acceleration peaks may be limited to three times the rms acceleration level. The rms acceleration level shall not be less than the specified minimum value. Resonant modes of the moving mass (vibration exciter moving element, fixture and either the test item or substitute equivalent mass) shall be equalized or compensated for within the frequency range of the test curve. The applied vibration spectrum shall normally be within the tolerance of ±1.5 dB between the frequencies of 50 and 1000 Hz, and within ±3 dB between 1000 and 2000 Hz. A wave analyzer shall be used to assure the specified equalization tolerances. The wave analyzer shall have a maximum bandwidth of 25 Hz below 1000 Hz, and 1/3 octave bandwidth above 1000 Hz with a sweep rate (Hz/second) not exceeding .034 times the filter bandwidth squared. The integration time constant shall not be less than 1 second.

The equipment shall be mounted in the test fixture the same as it would be in the service installation mounting. The following test shall be performed for each of the three orthogonal axis.

10.2 Test Procedure

10.2.1 Resonance Survey. A sinusoidal resonance survey of the equipment along each orthogonal axis shall be made. The frequency sweep shall be made slowly from 5 to 2000 Hz at 0.01 inch double amplitude or ±2g, whichever is less. The equipment shall be required to operate satisfactorily after this test. Resonant points shall be noted and the response recorded and the modes of each resonance described. Resonant point shall have a transmissibility (output/input) of two or greater.

10.1.2 Sinusoidal Vibration Test. The equipment shall be vibrated along each orthogonal axis with 30 minute resonance dwells for up to two resonances in the 5 to 50 Hz region. If more than two resonances are noted only the two most severe resonances shall be used for resonance dwell. The balance of the 1.5 hour sinusoidal test shall be spent in vibration cycling with

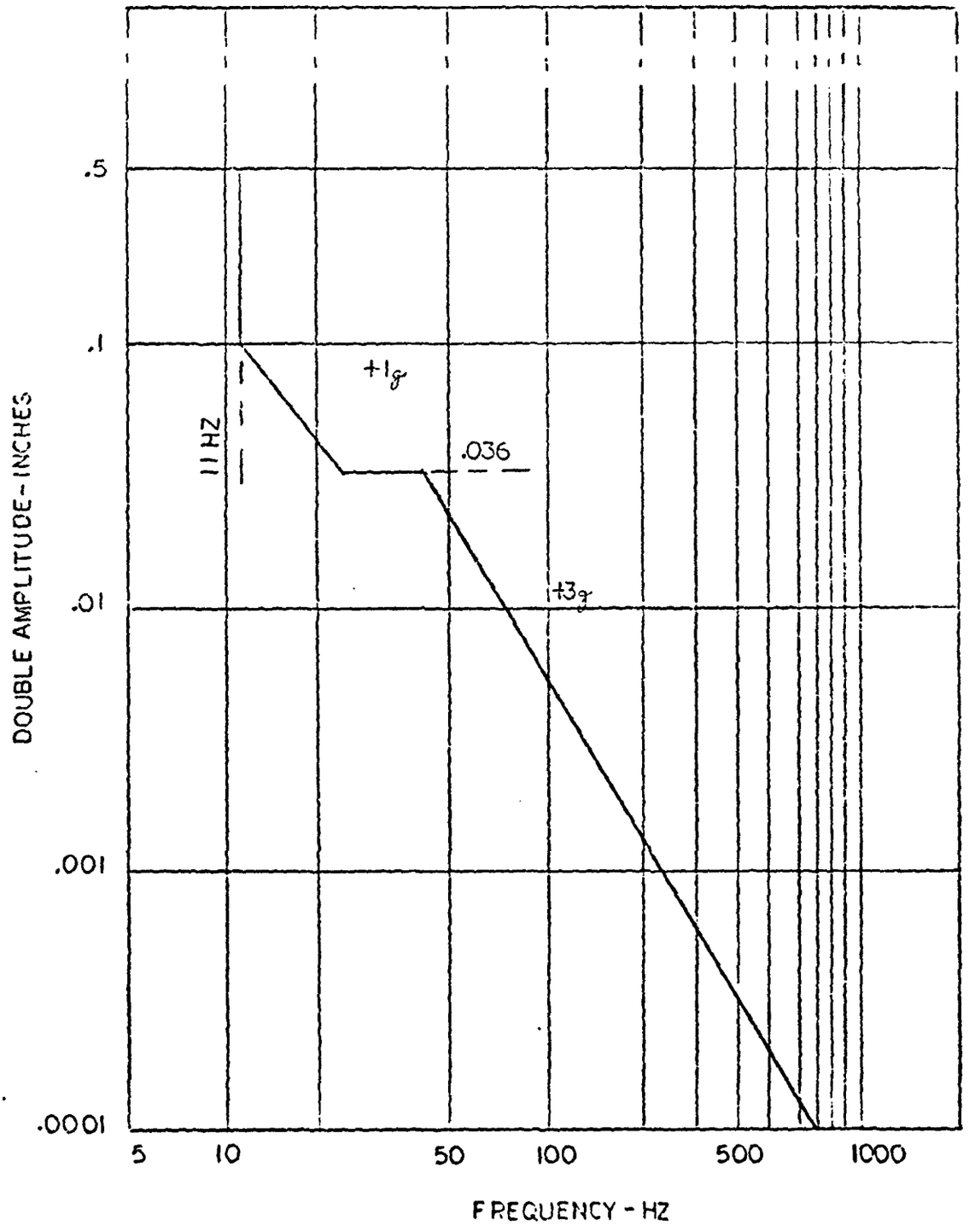
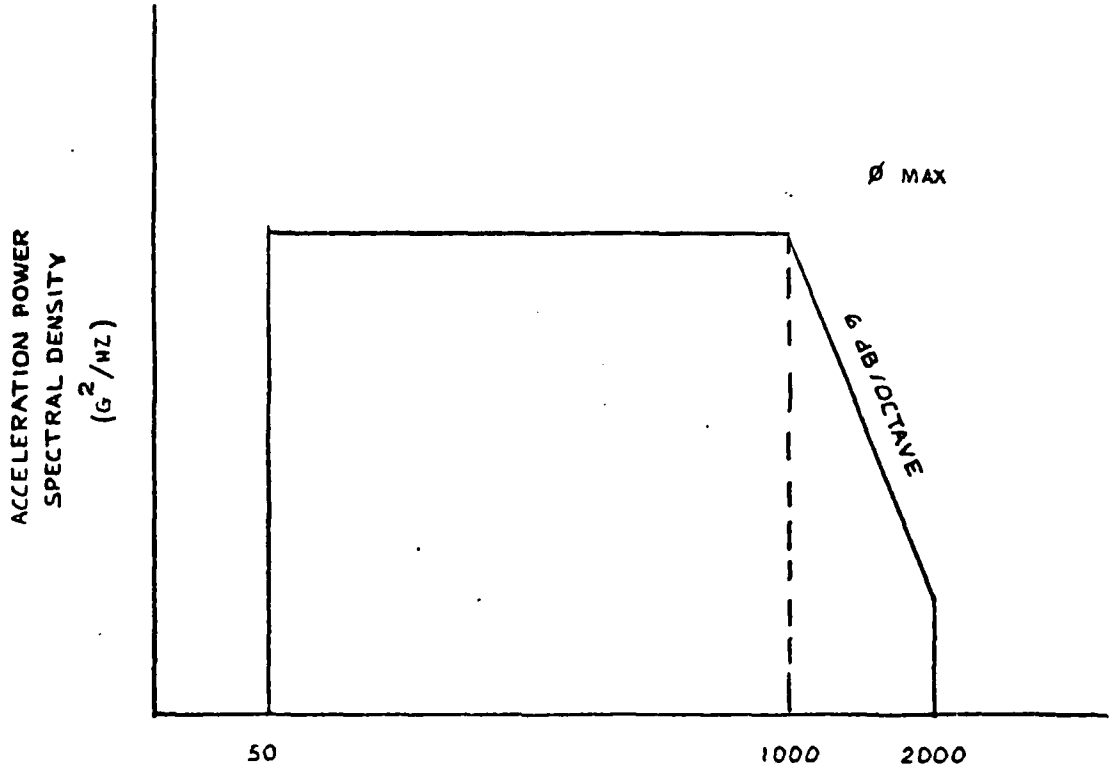


Figure I-1. Sinusodial Vibration Test Schedule



	Ø MAX	OVERALL RMS G MINIMUM	TEST TIME
SCHEDULE A	0.062	9.5	2.0 HRS
SCHEDULE B	0.018	5.1	0.5 HRS

Figure I -2 - RANDOM VIBRATION TEST SCHEDULE

10 minute log sweeps from 5 to 50 Hz and back to 5 Hz. The amplitudes or vibratory acceleration levels in accordance with the curve of Figure I-1 shall be used. The equipment shall operate during this test, but shall not be required to give specified performance. At the conclusion of this test, the specified performance shall be satisfactorily demonstrated, and the equipment shall be closely inspected for any failure.

10.2.2 Equipment Endurance Random Vibration. The equipment shall be vibrated along each orthogonal axis in accordance with the applicable random vibration spectrum shape, test level and test time specified by schedule A of Figure I-2. The equipment shall operate during this test, but shall not be required to give specified performance during the test. At the conclusion of the test, the specified performance shall be satisfactorily demonstrated and the equipment shall be inspected for any failure.

10.2.3 Equipment Performance Random Vibration. The equipment shall be vibrated along each orthogonal axis in accordance with the applicable random vibration spectrum shape, test level and test time specified by schedule B of Figure I-2. The equipment shall operate during this test and shall provide specified performance both during and after the test.

APPENDIX II

APPENDIX II

20. IFF TRANSPONDER TEMPERATURE-ALTITUDE TEST REQUIREMENTS

20.1 Temperature - Altitude Test. Temperature-altitude tests per Method 504, Procedure 1 of MIL-STD-810 are required, except that the test chamber conditions shall be as specified in Figure II-1, herein; and steps 7 and 10 of MIL-STD-810 shall be modified as follows:

Step 7. With the equipment non-operating, adjust the chamber conditions to those specified for Step 6, Figure II-1. After the chamber conditions and equipment temperature have stabilized, the equipment shall be operated at the highest specified input voltage for one hour. The chamber condition shall then be adjusted to those specified in Step 7 of Figure II-1. This change shall be accomplished as nearly linear with time as possible within 0.5 minutes. The equipment shall then continue to operate for 29.5 minutes at these conditions. The equipment shall be checked for satisfactory operation during the entire period of time covered by this step and the results recorded. Thermocouple readings shall be recorded every 10 minutes during the first hour of a cycle and every 2 minutes thereafter. This step shall be repeated for four cycles.

Step 10. With the equipment non-operating, adjust the chamber conditions to those specified for Step 9, Figure II-1. After the chamber conditions and equipment temperatures have stabilized, the equipment shall be operated at the highest specified input voltage for one hour. The chamber condition shall then be adjusted to those specified in Step 10 of Figure II-1. This change shall be accomplished as nearly linear with time as possible within two minutes. The equipment shall then continue to operate for 28 minutes at these conditions. The equipment shall be checked for satisfactory operation during the entire period of time covered by this step and the results recorded. Thermocouple readings shall be recorded every 10 minutes during the first hour of a cycle and every two minutes thereafter. This step shall be repeated for four cycles.

Test chamber conditions for temperature-altitude test														
Step	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Temperature (°C)	-62	-54	-54	-10	95	71	95		71	95	71			
Altitude (1000 Ft.)	Atm	Atm	70	Atm	Atm	Atm	Atm	Omit	50	70	70	Omit	Omit	Room Ambient
Time (Minutes)	120				960	240	30*		240	30*	240			
* Includes Transient Time														

FIGURE II-1 - RT-1063 B/APX-101(V) TEMPERATURE - ALTITUDE TEST REQUIREMENTS

APPENDIX III

APPENDIX III

30. INTERFACE

30.1 General. The IFF Transponder shall accept inputs, provide outputs, and be compatible with the interface whose characteristics are listed in Table III-1 and paragraphs 30.2 through 30.56.

Table III-1. Interface Table of Contents

Table III-1. Interface Table of Contents (Continued)

Table III-1. Interface Table of Contents (Continued)

30.2 Mode C code enable

1.	SIGNAL TITLE:	MC Code Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	Air Data Computer
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	11
6.	IFF TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	*
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Maximum steady state signal current shall not exceed 2.5 ma for a logic one level input (see 15 below).
9.	VOLTAGE RANGE:	Maximum open circuit voltage shall not exceed +15 vdc
10.	FREQUENCY RANGE:	DC
11.	SHIELDING REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	LOGIC ONE LEVEL (PULSE ENABLE):	≤3K ohms
16.	LOGIC ZERO LEVEL (PULSE ENABLE):	≥100K ohms
17.	SPECIAL REQUIREMENTS:	None

*

J1-31	A1 Enable	J1-30	B4 Enable
J1-32	A2 Enable	J1-1	C1 Enable
J1-33	A4 Enable	J1-2	C2 Enable
J1-6	B1 Enable	J1-3	C4 Enable
J1-7	B2 Enable	J1-4	D2 Enable
		J1-5	D4 Enable

30.3 Lower antenna inhibit.

1.	SIGNAL:	Lower Antenna Inhibit
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Antenna Select Panel
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-8
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	LOWER ANTENNA INHIBIT	$\leq$ 1V at 20 mA (Ground)
16.	LOWER ANTENNA NORMAL:	$\geq$ 20K ohms (Open)
17.	SPECIAL REQUIREMENTS:	None

30.4 Upper antenna inhibit.

1.	SIGNAL:	Upper Antenna Inhibit
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Antenna Select Panel
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT	J1-9
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 -20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	UPPER ANTENNA INHIBIT:	≤ 1V at 20 mA (Ground)
16.	UPPER ANTENNA NORMAL:	≥ 20K ohms (Open)
17.	SPECIAL REQUIREMENTS:	None

30.5	Caution light interlock.	
1.	SIGNAL:	Caution Light Interlock
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	Kit-1A/TSEC
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-10
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	INTERLOCK ON	$\leq$ 1.0 vdc 20 mA (Caution Light Can Be Enabled)
16.	INTERLOCK OFF	$\geq$ 20K
17.	SPECIAL REQUIREMENTS:	None

30.6 M-4 caution light.

1.	SIGNAL TITLE:	M-4 Caution Light
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	Caution Panel
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-11
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 100 mA
9.	VOLTAGE RANGE:	0 - 28 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	CAUTION LIGHT ON:	≥ 56K ohms (Open)
16.	CAUTION LIGHT OFF:	≤ 1.0V at 100 mA (Ground)
17.	SPECIAL REQUIREMENTS:	None

30.7 M-4 reply light.

1.	SIGNAL:	M-4 Reply Light
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	IFF Control
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-12
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax - 80 mA
9.	VOLTAGE RANGE:	0 - 28 vdc MIL-STD-704
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	ON LEVEL:	$\leq$ 1.0V at 50 mA
16.	OFF LEVEL:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.3 Mode 4 reply light. (C-6280)

1.	SIGNAL TITLE:	Mode 4 Reply Light
2.	SIGNAL TYPE:	DC Voltage
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	IFF Control
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-12
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD CURRENT:	200 mA max.
9.	VOLTAGE RANGE:	0 - 28 vdc
10.	FREQUENCY RANGE:	N/A
11.	ISOLATION REQUIREMENTS:	N/A
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	REPLY LIGHT ON:	28 vdc @ 200 mA max.
16.	REPLY LIGHT OFF:	0 ± 1 vdc
17.	SPECIAL REQUIREMENTS:	Requires +28 v Aircraft power applied to pin J1-28

30.9 Bit test Go.

1.	SIGNAL:	Bit Test Go
2.	SIGNAL TYPE:	Bi-Level Ground/Open
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	IFF Control
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-13
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax - 20 mA
9.	VOLTAGE RANGE:	0 - 28 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	GO LEVEL	$\geq$ 20K ohms
16.	NO-GO LEVEL	$\leq$ 0.5V at 20 mA
17.	SPECIAL REQUIREMENTS:	None

30.10 Bit/monitor No-Go.

1.	SIGNAL:	Bit Monitor "No-Go"
2.	SIGNAL TYPE:	Bi-Level Ground/Open
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	IFF Control
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-14
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 28 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	GO	≤ 0.5V at 20 mA
16.	NO-GO	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	This output shall indicate an open whenever the transponder is OFF.

30.11 Mode 3/A code enable.

1.	SIGNAL TITLE:	Mode 3/A code enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	Main Comm Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	12
6.	CONNECTOR/PIN ASSIGNMENT:	*
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M3/A CODE ENABLE:	≤1.0 vdc at 20 mA
16.	M3/A CODE DISABLE:	≥20K ohms
17.	SPECIAL REQUIREMENTS:	None

*

J1-51	A1 Enable	J1-19	C1 Enable
J1-52	A2 Enable	J1-41	C2 Enable
J1-53	A4 Enable	J1-42	C4 Enable
J1-16	B1 Enable	J1-43	D1 Enable
J1-17	B2 Enable	J1-44	D2 Enable
J1-18	B4 Enable	J1-45	D4 Enable

30.12 Code enable return.

1.	SIGNAL:	Code Enable return
2.	SIGNAL TYPE:	Return Line
3.	SOURCE:	Main Comm Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	IFF TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-21
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD IMPEDANCE:	N/A
9.	VOLTAGE RANGE:	0 ± 0.5 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	None

30.13 Code enable return.

1.	SIGNAL:	Code Enable Return
2.	SIGNAL TYPE:	Return Line
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	IFF TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-22
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD IMPEDANCE:	N/A
9.	VOLTAGE RANGE:	0 ± 0.5 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	None

30.14	IFF power relay control.	
1.	SIGNAL:	IFF Power Relay Control
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-23
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax - 200 mA
9.	VOLTAGE RANGE:	0 - 28 vdc max MIL-STD-704
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	POWER ON:	$\leq$ 0.5 vdc at 200 mA
16.	POWER OFF:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.15 +28 VDC

1.	SIGNAL:	+28 VDC
2.	SIGNAL TYPE:	Power
3.	SOURCE:	Aircraft, critical Bus
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT	J1-24
7.	SOURCE IMPEDANCE:	See 9 below
8.	LOAD CURRENT:	3 Amperes
9.	VOLTAGE RANGE:	per MIL-STD-704, Category B
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	None

30.16 Mode 4 caution light.

1.	SIGNAL TITLE:	Mode 4 Caution Light
2.	SIGNAL TYPE:	DC Voltage
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	KIT-1A/TSEC
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-26
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD CURRENT:	1.0 Amp
9.	VOLTAGE RANGE:	0 - 28 vdc
10.	FREQUENCY RANGE:	N/A
11.	ISOLATION REQUIREMENT:	N/A
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	CAUTION LIGHT ON:	28 vdc @ 1.0 Amp (max)
16.	CAUTION LIGHT OFF:	0 ± 1 vdc
17.	SPECIAL REQUIREMENTS:	Requires +28v Aircraft power applied to pin J1-28

30.17 +28 VDC Return

1.	SIGNAL:	+28 VDC Return
2.	SIGNAL TYPE:	Return Line
3.	SOURCE:	Aircraft
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/ PIN ASSIGNMENT	J1-27
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD CURRENT:	N/A
9.	VOLTAGE RANGE:	0±0.1 VDC
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	None

30.18 Aircraft +28 VDC

1.	SIGNAL	Aircraft +28 VDC
2.	SIGNAL TYPE:	Power
3.	SOURCE:	Aircraft
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR / PIN ASSIGNMENT:	J1-28
7.	SOURCE IMPEDANCE:	See 9 below
8.	LOAD CURRENT:	300 mA
9.	VOLTAGE RANGE:	per MIL-STD 704 Cat B
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	Must be used when C-6280 control is utilized.

30.19 Monitor Control (C-6280)

1.	SIGNAL:	Monitor Control (C-6280)
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1.
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-29
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	MONITOR ENABLE:	$\leq$ 1.0 vdc @ 20 mA
16.	MONITOR DISABLE:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.20 Mode C return.

1.	SIGNAL TITLE:	Mode C Return
2.	SIGNAL TYPE:	Signal Return
3.	SOURCE:	Air Data Computer
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	IFF TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-35
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD IMPEDANCE:	N/A
9.	VOLTAGE RANGE:	N/A
10.	FREQUENCY RANGE:	DC
11.	SHIELDING REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	LOGIC ONE LEVEL:	N/A
16.	LOGIC ZERO LEVEL:	N/A
17.	SPECIAL REQUIREMENTS:	The sum of the signal currents shall not exceed 30 mA.

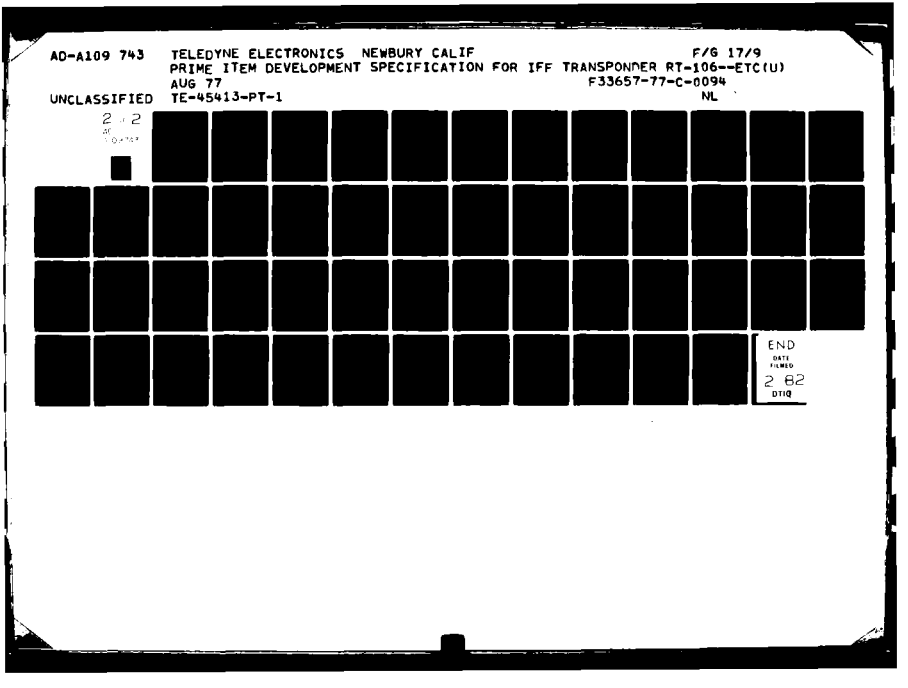
30.21 Mode 4 reply light test.

1.	SIGNAL:	Mode 4 Reply Light Test
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	Interior Lighting Control Panel
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-36
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 100 mA
9.	VOLTAGE RANGE:	8 to 28 vac or 28 vdc
10.	FREQUENCY RANGE:	DC or AC (400 Hz)
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	REPLY LIGHT TEST ON:	$\leq$ 1 V at 20 mA (Ground)
16.	REPLY LIGHT TEST OFF:	$\geq$ 20K ohms (Open)
17.	SPECIAL REQUIREMENTS:	None

30.22 Transponder No-Go.

1.	SIGNAL:	Transponder "No-Go"
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	Avionics Status Panel
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-37
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 100 mA
9.	VOLTAGE RANGE:	0 -28 vdc nom, max transient 40 vdc pos. 10 vdc neg.
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	NO-GO	$\leq$ 1.5 V at 50 mA (Ground)
16.	GO	$\geq$ 50K ohms (Open)
17.	SPECIAL REQUIREMENTS:	None

NOTE: An external ground applied to this line shall not cause an internal fault indication.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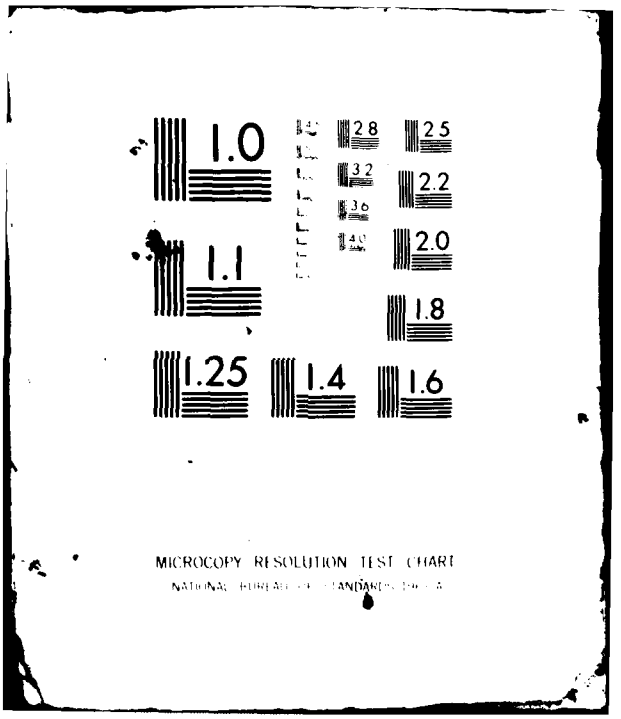
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MICROCOPY RESOLUTION TEST CHART

30.23 Antenna No-Go.

1.	SIGNAL TITLE:	Antenna No-Go
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	Avionics Status Panel
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-38
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 100 mA
9.	VOLTAGE RANGE:	0 - 28 vdc nom, max transient = 40 vdc pos., 10 vdc neg.
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	NO-GO LEVEL:	≤ 1.5 V at 50 mA (Ground)
16.	GO LEVEL:	≥ 50 K ohms (open)
17.	SPECIAL REQUIREMENTS:	None

NOTE: An external ground applied to this line shall not cause an internal fault indication

30.24 KIT-1A/TSEC computer No-Go.

1.	SIGNAL TITLE:	KIT-1A/TSEC Computer No-Go
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	Avionics Status Panel
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-39
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 100 mA
9.	VOLTAGE RANGE:	0 - 28 vdc nom., max. transient = 40 vdc pos. 10 vdc neg.
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	NO-GO LEVEL:	≤ 1.5V at 50 mA max (ground)
16.	GO LEVEL:	≥ 50K ohms (open)
17.	SPECIAL REQUIREMENTS:	

30.25 C-6280 Monitor/Test Light.

1.	SIGNAL TITLE:	C-6280 Monitor/Test Light
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	IFF Control
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-40
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD CURRENT:	50-200 ma.
9.	VOLTAGE RANGE:	0-28vdc
10.	FREQUENCY REQUIREMENTS:	N/A
11.	ISOLATION REQUIREMENTS:	N/A
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	Present within 15 interrogations (approximately 40 milliseconds) after BIT initiation or after approximately 15 replies to an external interrogation (monitor mode) when the limits specified herein for frame pulse spacing, receive and transmit frequency, receiver sensitivity, transmitter power and antenna VSWR are met. After the signal is present, it shall remain for a duration of at least 2 seconds and shall automatically be renewed within each series of 15 consecutive valid transponder replies. It shall automatically reset to "MONITOR LIGHT OFF" within 4 seconds after cessation to meet the above conditions.

15.	MONITOR LIGHT ON:	28 vdc at 200 ma Max.
16.	MONITOR LIGHT OFF:	0 ± 1 vdc
17.	SPECIAL REQUIREMENTS:	Requires +28v Aircraft power applied to pin J1-28

30.26 Mode 1 code enable.

1.	SIGNAL:	Mode 1 Code Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	5
6.	CONNECTOR/PIN ASSIGNMENT:	*
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	I = 20 mA max
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M1 CODE ENABLE:	≤ 1.0 vdc at 20 mA
16.	M1 CODE DISABLE:	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

*

J1-46	A1 Enable
J1-47	A2 Enable
J1-48	A4 Enable
J1-49	B1 Enable
J1-50	B2 Enable

30.27 Switched Primary Power Input

1.	SIGNAL:	Switched Primary Power Input
2.	SIGNAL TYPE:	Power
3.	SOURCE:	Aircraft critical Bus
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/ PIN ASSIGNMENT:	J1-54
7.	SOURCE IMPEDANCE:	See 9 below
8.	LOAD CURRENT:	5 amperes max.
9.	VOLTAGE RANGE:	+28 VDC or 115 VAC per MIL-STD 704 Category B
10.	FREQUENCY RANGE:	DC to 400 Hz.
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTER-ISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	None

30.28 Chassis Ground

1.	SIGNAL:	Chassis Ground
2.	SIGNAL TYPE:	Ground
3.	SOURCE:	Aircraft Frame
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/ PIN ASSIGNMENT:	J1-55
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD CURRENT:	N/A
9.	VOLTAGE RANGE:	N/A
10.	FREQUENCY RANGE:	N/A
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTER-ISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	None

30.29 Switched Primary Power Output

1.	SIGNAL:	Switched primary Power Output
2.	SIGNAL TYPE:	Power
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	KIT-1A/TSEC Computer
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/ PIN ASSIGNMENT:	J1-56
7.	SOURCE IMPEDANCE:	See 15 below
8.	LOAD CURRENT:	5 amperes max.
9.	VOLTAGE RANGE:	See 15 below
10.	FREQUENCY RANGE:	See 15 below
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTER-ISTICS	N/A
15.	SPECIAL REQUIREMENTS:	Characteristics are those of power supplied to J1-54.

30.30 Mode C test enable.

1.	SIGNAL:	Mode C Test Enable
2.	SIGNAL TYPE:	Bi-Level Open/ Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-57
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	MC TEST ENABLE:	< 1.0 vdc at 20 mA
16.	MC TEST DISABLE:	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	Test enable duration shall be 150 to 200 msec. Total BIT time for all modes shall be less than 1 second.

30.31 Mode 3/A test enable.

1.	SIGNAL:	Mode 3/A Test Enable
2.	SIGNAL TYPE:	Bi-Level Open/ Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-58
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M3/A TEST ENABLE:	≤ 1 vdc at 20 mA
16.	M3/A TEST DISABLE:	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	Test enable duration shall be 150 to 200 msec. Total BIT time for all modes shall be less than 1 second.

30, 32	Mode 2 test enable.	
1.	SIGNAL:	Mode 2 Test Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-59
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M2 TEST ENABLE:	≤ 1 vdc at 20 mA
16.	M2 TEST DISABLE:	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	Test enable duration shall be 150 to 200 msec. Total BIT time for all modes shall be less than 1 second.

30.33 Mode 1 test enable.

1.	SIGNAL:	Mode 1 Test enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-60
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M1 TEST ENABLE:	≤ 1 vdc at 20 mA
16.	M1 TEST DISABLE:	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	Test enable duration shall be 150 to 200 msec. Total BIT time for all modes shall be less than 1 second.

30.34 Mode 4 reply light enable.

1.	SIGNAL:	Mode 4 Reply Light Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-63
7.	SOURCE IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M4 REPLY LIGHT ENABLE:	≤ 1.0 vdc at 20 mA
16.	M4 REPLY LIGHT DISABLE:	≥ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.35 Mode C enable.

1.	SIGNAL:	Mode C Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-65
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M-C ENABLE:	$\leq$ 1 vdc at 20 mA
16.	M-C DISABLE:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.36 Mode 3/A enable.

1.	SIGNAL:	Mode 3/A Enable
2.	SIGNAL TYPE:	Bi-Level Open/ Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-66
7.	SOURCE OF IMPEDANCE:	See 15 and 16 below.
8.	LOAD CURRENT:	I = 20 mA
9.	VOLTAGE RANGE:	0 - 20vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M3/A ENABLE:	$\leq$ 1.0 vdc at 20 mA
16.	M3/A DISABLE:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.37 Mode 2 enable.

1.	SIGNAL:	Mode 2 enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-67
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M2 ENABLE:	$\leq$ 1.0 vdc at 20 mA
16.	M2 DISABLE:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.38 Mode 1 enable.

1.	SIGNAL:	Mode 1 Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-68
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M1 ENABLE:	$\leq$ 1.0 vdc at 20 mA
16.	M1 DISABLE:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.39 Code zeroize and alarm.

1.	SIGNAL TITLE:	Code zeroize and alarm
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	KIT-1A/TSEC Computer
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-69
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	ENABLE:	$\leq$ 1.0 vdc at 20 mA
16.	DISABLE:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.40 Audio enable.

1.	SIGNAL:	Audio Enable
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-70
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	M4 AUDIO ON:	$\leq$ 1.0 vdc at 20 mA
16.	M4 AUDIO OFF:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.41 Emergency enable.

1.	SIGNAL:	Emergency Enable
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-71
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	EMERGENCY	$\leq$ 1.0 vdc at 20 mA
16.	NORMAL	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.42 I/P control.

1.	SIGNAL TITLE:	I/P Control
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	Main Comm Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-72
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	I/P ENABLE:	$\leq$ 1.0 vdc at 20 mA
16.	I/P OUT	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.43 Sensitivity select (C-6280).

1.	SIGNAL:	Sensitivity Select (C-6280)
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-73
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	NORM SENSITIVITY:	≤ 1V @ 20 mA (ground)
16.	LOW SENSITIVITY:	≥ 20K ohms (open)
17.	SPECIAL REQUIREMENTS:	None

30.44 Standby select (C-6280).

1.	SIGNAL:	Standby Select (C-6280)
2.	SIGNAL TYPE:	Bi-Level Open/Ground
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-74
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	STANDBY:	$\geq$ 20K ohms
16.	NORMAL:	$\leq$ 1.0V at 20 mA
17.	SPECIAL REQUIREMENTS:	None

30.45 Low sensitivity select.

1.	SIGNAL:	Low Sensitivity Select
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-75
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax = 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	LOW SENSITIVITY:	$\leq$ 1V at 20 mA (Ground)
16.	NORM SENSITIVITY:	$\geq$ 20K ohms (Open)
17.	SPECIAL REQUIREMENTS:	None

30.46 Standby enable.

1.	SIGNAL:	Standby Enable
2.	SIGNAL TYPE:	Bi-Level Open/Gnd
3.	SOURCE:	IFF Control
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J1-76
7.	SOURCE IMPEDANCE:	See 15 and 16 below
8.	LOAD CURRENT:	Imax - 20 mA
9.	VOLTAGE RANGE:	0 - 20 vdc
10.	FREQUENCY RANGE:	DC
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	STANDBY:	$\leq$ 1.0 V at 20 mA
16.	NORMAL:	$\geq$ 20K ohms
17.	SPECIAL REQUIREMENTS:	None

30.47 Shield (Audio)

1.	SIGNAL:	Shield (Audio)
2.	SIGNAL TYPE:	Shield
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	See 15 below
5.	NUMBER OF WIRES:	See 15 below
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-77
7.	SOURCE IMPEDANCE:	N/A
8.	LOAD CURRENT:	N/A
9.	VOLTAGE RANGE:	N/A
10.	FREQUENCY RANGE:	N/A
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE CHARACTERISTICS:	N/A
15.	SPECIAL REQUIREMENTS:	Shield for lines connected to J1-78 and J1-79

30.48 M-4 audio.

1.	SIGNAL TITLE:	M-4 Audio
2.	SIGNAL TYPE:	Audio Pulses
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	Integrated Comm Control
5.	NUMBER OF WIRES:	2
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J1-78-79
7.	SOURCE IMPEDANCE:	150 ohm
8.	LOAD IMPEDANCE:	150/300 ohm
9.	VOLTAGE RANGE:	0 - 3 vac
10.	FREQUENCY RANGE:	300 - 3000 Hz
11.	ISOLATION REQUIREMENTS:	Signal Return Grounded at Source
12.	RISE TIME:	N/A
13.	FALL TIME:	N/A
14.	PULSE WIDTH:	≥ 500 us for prf less than 200
15.	LOGIC ONE LEVEL:	N/A
16.	LOGIC ZERO LEVEL:	N/A
17.	SPECIAL REQUIREMENTS:	None

30.49 Suppression input.

1.	SIGNAL TITLE:	Transponder Suppression Input
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	TEWS
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-A
7.	SOURCE IMPEDANCE:	68Ω ±10%
8.	LOAD IMPEDANCE:	680 ohms ± 10%
9.	VOLTAGE RANGE:	+6 to +15 volts
10.	FREQUENCY RANGE:	455 Hz, max prf. (see # 16 below)
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	(10-90%) 0.5 microseconds max.
13.	FALL TIME:	1.5 microseconds max.
14.	PULSE CHARACTERISTICS:	Duration 1.5 to 350 microseconds DC voltage (no signal) 0 ± 1.0 volt pulse amplitude variation (including overshoot) 10% max.
15.	SPECIAL REQUIREMENTS:	Shielded line (coax)
16.	DUTY CYCLE:	20% max.

30.50 Mode 4 reply video.

1.	SIGNAL TITLE:	Mode 4 Reply Video Input
2.	SIGNAL TYPE:	3 pulses
3.	SOURCE:	KIT-1A/TSEC Computer
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-B
7.	SOURCE IMPEDANCE:	90 ± 10% ohms
8.	LOAD IMPEDANCE:	90 ± 10% ohms
9.	VOLTAGE RANGE:	+3 to +5 volts
10.	FREQUENCY RANGE:	prf
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	0.1 microseconds max.
13.	FALL TIME:	0.25 microseconds max.
14.	PULSE CHARACTERISTICS:	a. Duration: 0.5 ± 0.2 microseconds b. Spacing: 1.8 ± 0.2 microseconds c. DC voltage (no signal): ±0.5 volts max.
15.	SPECIAL REQUIREMENTS:	Coax
16.	NEGATIVE OVERSHOOT CAUSED BY LOAD:	Less than 1.5 volts
17.	POLARITY:	Positive
18.	TIMING:	The first reply pulse in the first reply position shall occur 198.5 ± .75 microseconds after the fourth sync pulse in the interrogation. The spacing between reply pulse positions shall be within ± 0.1 microseconds of multiples of 4 microseconds.

19. MINIMUM SPACING:

In normal operation, Mode 4 replies will consist of three pulses having a nominal spacing of 1.8 microseconds between adjacent pulses. The spacing between adjacent pulses are required to be within 0.2 microseconds of their nominal values. However in no case shall the total spacing between the first and third pulse differ from its nominal value of 3.6 microseconds by more than 0.2 microseconds.

30.51 Mode 4 disparity.

1.	SIGNAL TITLE:	Mode 4 Disparity Input
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	KIT-1A/TSEC Computer
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-C
7.	SOURCE IMPEDANCE:	90 ± 10% ohms
8.	LOAD IMPEDANCE:	90 ± 10% ohms
9.	VOLTAGE RANGE:	+3 to +5 volts
10.	FREQUENCY RANGE:	prf
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	0.15 microseconds max.
13.	FALL TIME:	0.5 microseconds max.
14.	PULSE CHARACTERISTICS:	a. Duration: 0.3 to 1.0 microseconds b. DC voltage (no signal): -4 to + 2 volts c. Undesired signal: ± 0.7 volts max.
15.	SPECIAL REQUIREMENTS:	Coax
16.	NEGATIVE OVERSHOOT CAUSED BY LOAD:	1.5 volts maximum
17.	POLARITY:	Positive

30.52 Auxiliary trigger pulse.

1.	SIGNAL TITLE:	Auxiliary Trigger Pulse
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	TBD
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-D
7.	SOURCE IMPEDANCE:	TBD
8.	LOAD IMPEDANCE:	90 ± 10% ohms
9.	VOLTAGE RANGE:	+15 to +30 volts
10.	FREQUENCY RANGE:	20,000 pps max.
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	0.1 microseconds max.
13.	FALL TIME:	0.2 microseconds max.
14.	PULSE CHARACTERISTICS:	a. Duration: 0.3 to 1.5 microseconds b. Spacing 2.0 microseconds min.
15.	SPECIAL REQUIREMENTS:	Coax
16.	POLARITY:	Positive

30.53 Suppression output.

1.	SIGNAL TITLE:	Suppression Output
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	TEWS
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-E
7.	SOURCE IMPEDANCE:	100 ± 10% ohms
8.	LOAD IMPEDANCE:	2K ± 10% ohm shunted by 1850 pf
9.	VOLTAGE RANGE:	+10 to 40 volts
10.	FREQUENCY RANGE:	20,000 pulses per second, max.
11.	ISOLATION REQUIREMENTS:	None
12.	START TIME:	For SIF the suppression pulse shall rise to 7.5 volts minimum at least 0.5 μsec but not more than 3.0 μsec before the RF output pulse has reached 10% of its amplitude. For auxiliary trigger and Mode 4 replies, the pulse shall rise to 7.5 volts minimum less than 0.5 μsec before the RF output pulse has reached 10% of its amplitude. The pulse shall rise to 20 volts minimum before the RF pulse has reached 90% of its amplitude. Maximum rise time (10-90%) shall be 0.5 μsec.
13.	STOP TIME:	The suppression pulse shall be less than 1.0 volt 3.0 μsec after the 10% amplitude point of the trailing edge of the last RF framing pulse of the reply pulse train or after the 10% amplitude point of the trailing edge of each RF output pulse resulting from the auxiliary trigger input.

14.	PULSE CHARACTERISTICS:	(See 12 and 13) 100 μsec maximum
15.	LOGIC ONE LEVEL (SUPPRESSION):	10 - 40 volts
16.	LOGIC ZERO LEVEL (NON-SUPPRESSION):	0 ± 0.5 volts
17.	SPECIAL REQUIREMENTS:	Shielded Line (coax)
18.	DUTY CYCLE:	15% max.

30.54 Mode 4 trigger.

1.	SIGNAL TITLE:	Mode 4 Trigger Output
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	KIT-1A/TSEC Computer
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-F
7.	SOURCE IMPEDANCE:	90 ± 10% ohms
8.	LOAD IMPEDANCE:	90 ± 10% ohms
9.	VOLTAGE RANGE:	+1.5 to 5.0 volts
10.	FREQUENCY RANGE:	3000 pps max.
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	0.1 microseconds max.
13.	FALL TIME:	1.0 microseconds max.
14.	PULSE CHARACTERISTICS:	a. Duration: 0.5 to 3.0 microseconds b. DC Voltage (No signal): ±0.5 volts max.
15.	SPECIAL REQUIREMENTS:	Coax
16.	POLARITY:	Positive
17.	DELAY:	The Delay between the leading edge of the fourth interrogation pulse at the Mode 4 Video Jack and the Mode 4 Trigger Pulse shall be between the limits of 0.0 and 0.6 microseconds.

30.55 Mode 4 video.

1.	SIGNAL TITLE:	Mode 4 Video Output
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	KIT-1A/TSEC Computer
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-G
7.	SOURCE IMPEDANCE:	90 ± 10% ohms
8.	LOAD IMPEDANCE:	90 ± 10% ohms
9.	VOLTAGE RANGE:	+1.5 to +5.0 volts
10.	FREQUENCY RANGE:	3000 PPS Max.
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	0.1 Microsecond max.
13.	FALL TIME:	0.2 Microsecond max.
14.	PULSE CHARACTERISTICS:	a. Duration: 0.45 to 0.65 microseconds for RF pulse widths between 0.4 and 0.6 microseconds. b. DC voltage (no signal): +0.5 volts max during the period beginning with the leading edge at the mode 4 trigger and ending 70 microseconds later.
15.	DROOP	1.5 dB maximum over the complete interrogation.

30.56 Suppression input.

1.	SIGNAL TITLE:	Suppression Input
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	Blanker
4.	DESTINATION:	IFF Transponder
5.	NUMBER OF WIRES:	1
6.	CONNECTOR/PIN ASSIGNMENT:	J2-H
7.	SOURCE IMPEDANCE:	TBD
8.	LOAD IMPEDANCE:	2200 ohms in parallel with 50 PF
9.	VOLTAGE RANGE:	15 to 70 volts
10.	FREQUENCY RANGE:	455 Hz max PRF (See #16 below)
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	At least 10 volts per microsecond
13.	FALL TIME:	Peak amplitude to 1.0 volt within 10 microseconds
14.	PULSE CHARACTERISTICS:	Duration 1 to 350 microseconds DC Voltage (no signal) 0 ± 1.0 volt Pulse Amplitude Variation (Including overshoot) 10% max.
15.	SPECIAL REQUIREMENTS:	Shielded line (coax)
16.	DUTY CYCLE:	20% max.

30.57 IFF Transponder RF Interfaces. The IFF transponder shall be compatible with interfaces that consists of RF input and output signals that use the same transmission line.

30.58 Lower Antenna Input/Output:

1.	SIGNAL TITLE:	Lower Antenna Input/Output
2.	SIGNAL TYPE:	Radio Frequency (RF)
3.	SIGNAL TO/FROM:	Lower IFF Antenna
4.	FUNCTION:	Transmit IFF replies and receive IFF interrogations
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	P3
7.	IMPEDANCE:	51 ohms
8.	FREQUENCY RANGE:	1030 and 1090 MHz
9.	SPECIAL REQUIREMENTS:	Coaxial cable
10.	MAXIMUM PEAK POWER:	30 dBw (1000 watts)

30.59 Upper Antenna Input/Output:

1.	SIGNAL TITLE:	Upper Antenna Input/Output
2.	SIGNAL TYPE:	Radio Frequency (RF)
3.	SIGNAL TO/FROM:	Upper IFF Antenna
4.	FUNCTION:	Transmit IFF replies and receive IFF interrogations
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	P4
7.	IMPEDANCE	51 ohms
8.	FREQUENCY RANGE:	1030 and 1090 MHz
9.	SPECIAL REQUIREMENTS:	Coaxial cable
10.	MAXIMUM PEAK POWER:	30 dBw (1000 watts)

APPENDIX IV

APPENDIX IV

40.0 INTERFACE CHARACTERISTICS FOR MAINTENANCE TEST CONNECTOR.

40.1 General. The IFF transponder shall provide maintenance test points whose characteristics are listed in paragraph 40.2. The test connector shall be Cannon Part No. 2DD100P or equivalent.

40.2 Age-Test Connector Pin Assignment.

PIN	FUNCTION	REMARKS
1	+28 VDC Switched	Same as J1-24
2	+5 VDC	+4.75-5.25 VDC
3	+12 VDC	+11.75-12.25 VDC
4	+43 VDC L-Band & Diversity Sw	+42-43.5 VDC
5	+37 VDC (Var) Array	+35-55 VDC
6	-12 VDC	-11.75-12.25 VDC
7	-5 VDC	-4.75-5.25 VDC
8	+28 VDC (Fused)	Same as J1-24
9	Meter Drive	74 ± 15 VPP, 400 Hz (To J6-35)
10	Code Enable	+3.6 ± 0.5V, 0-97.2 μsec pulse
11	Mode 3/A Normal Gate	+4.0 ± 0.5V, 23.2 or 27.5 μsec pulse
12	Spare	
13	Spare	
14	Mode 3/A Emergency Gate	97.2 μsec, Ground Level Pulse (quiescent +3.7 ± 0.5 Vdc)

PIN	FUNCTION	REMARKS
15	Mode 2 Emergency Gate	97.2 μsec, Ground Level Pulse (quiescent +3.7 ±0.5 Vdc)
16	Mode 1 Ident Gate	+3.9 ± 0.5V, 44.95 μsec pulse
17	Reply Enable	0.5 μsec, Ground Level Pulse (quiescent +3.7 ± 0.5 Vdc)
18	Discriminator	0.05 μsec, Ground Level Pulse (quiescent +3.7 ± 0.5 Vdc)
19	Pulse 105	+3.8 ± 0.5V, 0.4 μsec pulse
20	Processor Upper	+3.7 ±0.5V, 0.5-0.8 μsec pulse
21	Processor Lower	+3.7 ± 0.5V, 0.5-0.8 μsec pulse
22	Spare	
23	Spare	
24	Modulation	+3.7 ± 0.5V, 0.45 μsec pulses
25	Mode 4 Mod	+3.7 ± 0.5V, 0.45 μsec pulses
26	Strobe	+3.7 ± 0.5V, 0.5 μsec pulses
27	Code A	1.45 μsec, Ground Level Pulses (quiescent +4.5 ± 0.5 Vdc)
28	Code B	1.45 μsec, Ground Level Pulses (quiescent +4.6 + 0.5 Vdc)
29	Mode 4 Code	0.5 μsec, Ground Level Pulses (quiescent +3.6 ± 0.5 Vdc)
30	SIF Decode Depression	35 or 90 μsec, Ground Level Pulse (quiescent +3.8 ± 0.5 Vdc)

PIN	FUNCTION	REMARKS
31	SLS Decode	0.05 μsec, Ground Level Pulse (quiescent +4.5 ± 0.5 Vdc)
32	AOC Output	0-9V level
33	Channel Inhibit Upper	90 μsec, Ground Level Pulse (quiescent +4 ± 0.5 Vdc)
34	Channel Inhibit Lower	90 μsec, Ground Level Pulse (quiescent +4 ± 0.5 Vdc)
35	Meter Drive	74 ± 15 VPP, 400 Hz (To J6-9)
36	Standby Enable	Standby +4 ± 0.5V/Norm-GND
37	SLS Decode Gate	35 μsec, Ground Level Pulse (quiescent +3.9 ± 0.5 Vdc)
38	Mode 4 Decode Suppression	5.5-9 μsec, Ground Level Pulse (quiescent +4.5 ± 0.5 Vdc)
39	SIF Code	0.45 μsec, Ground Level Pulses (quiescent +3.9 ± 0.5 Vdc)
40	Mode 4 Reply Frame	5.5 μsec, Ground Level Pulse (quiescent +3.6 ± 0.5 Vdc)
41	M4 Video Gate	+3.7 ± 0.5V, 0-90 μsec pulse
42	M4 Decode Frame	0-90 μsec, Ground Level Pulse (quiescent +3.6 ± 0.5 Vdc)
43	M4 Reply Monitor	5.5 μsec, Ground Level Pulse (quiescent +3.6 ± 0.5 Vdc)
44	SIF Decode Gate	50 μsec, Ground Level Pulse (quiescent +5 Vdc)

PIN	FUNCTION	REMARKS
45	M4 Caution Monitor	0.5 μsec, Ground Level Pulse (quiescent +3.6 ± 0.5 Vdc)
46	M4 Delay Decode	1.5 μsec, Ground Level Pulse (quiescent +3.5 ± 0.5 Vdc)
47	BIT VSWR Video	+3.3 ± 0.5V, 0.3-0.7 μsec pulses
48	M4 Sens Gate	0-90 μsec, Ground Level Pulse (quiescent +4.5 ± 0.5V)
49	BIT Power Video	+3.1 ± 0.5V, 0.3-0.7 μsec pulses
50	BIT Frequency Video	+3.1 ± 0.5V, 0.3-0.7 μsec pulses
51	Test Enable	Enable:+3.9 ±0.5V/Inhibit: GND
52	Test Cycle	+3.4 ± 0.5V Square Pulse PRF 350 ±80 Hz
53	BIT Channel Upper	23 μsec, Ground Level Pulses (quiescent +3.8 ±0.5V)
54	BIT Reset	0.9 μsec, Ground Level Pulse (quiescent +3.8 ±0.5V)
55	Stimulator Gate	+3.5 ±0.5V, 23 μsec pulse
56	BIT Modulation Video	+3.5 ± 0.5V, 0.8 μsec pulses
57	BIT Channel Lower	23 μsec, Ground Level Pulse (quiescent +3.8 ± 0.5V)
58	Sensitivity Enable	Norm:GND/Low:+4.5 ± 0.5V
59	Decode Enable	Norm:+4.5 ± 0.5V/Inhibit:GND
60	BIT M4 Enable	+2.7 ± 0.5V, 5.5 μsec pulse
61	Discriminator Upper	0.05 μsec, Ground Level Pulses (quiescent +3.9 ± 0.5V)

PIN	FUNCTION	REMARKS
62	Discriminator Lower	0.05 μsec, Ground Level Pulses (quiescent +3.9 ± 0.5V)
63	Reset	0.5-5.5 μsec, Ground Level Pulse (quiescent +4.5 ± 0.5V)
64	Pulse 67	+3.6 ± 0.5V, 0.4 μsec pulse
65	M4 Switch	5.5 μsec, Ground Level Pulse (quiescent +3.9 ± 0.5V)
66	Gate Upper	Enable:+3.9 ± 0.5V/Inhibit:GND
67	Gate Lower	Enable:+3.9 ± 0.5V/Inhibit:GND
68	Auxiliary Modulation	+4.5 ± 0.5V, 0.5-1.5 μsec pulse
69	+15 VDC	+15.0-16.0 VDC
70	M4 Decode Gate	90 μsec, Ground Level Pulse (quiescent +4.2 ± 0.5V)
71	Monitor Inhibit	27 μsec, Ground Level Pulse (quiescent +3.7 ± 0.5V)
72	AOC Gate	Enable:GND/Inhibit:+4.8 ± 0.5V
73	Mode 4 Audio Enable	100 ns, Ground Level Pulse (quiescent +3.9 ± 0.5V)
74	Upper Channel Buffer	0.5-7V, 0.3-0.7 μsec pulses
75	Lower Channel Buffer	0.5-7V, 0.3-0.7 μsec pulses
76	Channel Select Upper	+3.9 ±0.5V, 23-90 μsec pulses
77	Channel Select Lower	+3.9 ± 0.5V, 23-90 μsec pulses

PIN	FUNCTION	REMARKS
78	BIT Lower on Enable	Enable:+3.9 ± 0.5V/Inhibit:GND
79	BIT Upper on Enable	Enable:+3.9 ± 0.5V/Inhibit:GND
80	BIT Control	+3.9 ± 0.5 VDC
81	BIT Stim Inhibit	23 μsec, Ground Level Pulse (quiescent +3.9 ± 0.5V
82	MON Reset	70 nsec, Ground Level Pulse (quiescent +3.9 ± 0.5V)
83	Delayed Pulse $\overline{2}$	1 μsec, Ground Level Pulses (quiescent +3.9 ± 0.5V)
84	Diversity Switch	Lower Ant:+4.5V/Upper Ant:GND
85	BIT Indicator	Go:+28 VDC/NO-GO:GND
86	Spare	
87	20 MHz Clock	200 ± 100 mV PP, 20 MHz
88	Spare	
89	Spare	
90	Spare	
91	Spare	
92	Chassis Ground	GND
93	Spare	
94	Spare	

PIN	FUNCTION	REMARKS
95	Spare	
96	Spare	
97	Spare	
98	Spare	
99	Spare	
100	UUT Ident	174 ohms ± 1% (w/respect to J6-92)

TELEDYNE ELECTRONICS

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PART 1 OF TWO PARTS

PRIME ITEM DEVELOPMENT SPECIFICATION

FOR

IFF TRANSPONDER

RT-1063C/APX101(V)

CI 650100A

AUTHENTICATED BY:

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UNITED STATES AIR FORCE
AERONAUTICAL SYSTEMS DIV.
DATE 2 Nov. 77

APPROVED BY:

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TELEDYNE ELECTRONICS
DATE 4/11/77

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3.2.1.4.2.1 Mode 4 trigger. The equipment shall generate a Mode 4 enabling trigger for the KIT-1A/TSEC transponder computer upon recognition of the Mode 4 sync pattern.

3.2.1.4.2.2 Mode 4 video. The IFF transponder shall provide Mode 4 video as specified with the following characteristics:

a.	Amplitude	2.0 to 5 volts across an impedance of 90 ± 10% ohms
b.	Polarity	Positive
c.	Duration	0.45 to 0.65 microseconds for rf input pulse widths between 0.4 and 0.6 microseconds except for the 4th sync pulse which must be 1.1 ±0.15 μsec wide.
d.	Rise Time	0.1 microsecond max.
e.	Decay Time	0.2 microsecond max.
f.	Undesired Signal Plus Quiescent dc Voltage	± 0.5 volts max during the period beginning with the leading edge of the Mode 4 Trigger and ending 70 μsec later.
g.	Droop	1.5 dB maximum over the complete interrogation.

3.2.1.4.2.3 Mode 4 reply light enable. Provisions shall be made to enable the Mode 4 reply light only when four or more Mode 4 replies are transmitted within a 0.033 second interval, or replies are transmitted at a rate of 50 or more per second for 0.25 seconds, as indicated by the presence of Mode 4 reply inputs followed within 0.5 microsecond by the transmission of rf reply pulses. The reply light enabling voltage shall not be generated if transmitted replies are generated at a constant rate of less than ten per second. The reply light shall remain enabled for a period of 2 to 5 seconds after the end of the enabling condition. In addition, a Mode 4 reply light test line shall be provided. The test line shall be an open/ground signal and shall activate the reply light in the ground condition independently of the power ON/OFF status of the Transponder.

a. For F-15 operation, the Mode 4 reply monitor enable output shall be an open for OFF and a ground level for ON. The reply light shall be powered by 8 volts AC to 28 volts AC, 400 Hz. The transponder enabling output circuitry shall supply a maximum of 100 ma in the ground (ON) condition.

30.55 Mode 4 video.

1.	SIGNAL TITLE:	Mode 4 Video Output
2.	SIGNAL TYPE:	Pulse
3.	SOURCE:	IFF Transponder
4.	DESTINATION:	KIT-1A/TSEC Computer
5.	NUMBER OF WIRES:	1
6.	TRANSPONDER CONNECTOR/PIN ASSIGNMENT:	J2-G
7.	SOURCE IMPEDANCE:	90 ± 10% ohms
8.	LOAD IMPEDANCE:	90 ± 10% ohms
9.	VOLTAGE RANGE:	+2.0 to +5.0 volts
10.	FREQUENCY RANGE:	3000 PPS Max.
11.	ISOLATION REQUIREMENTS:	None
12.	RISE TIME:	0.1 Microsecond max.
13.	FALL TIME:	0.2 Microsecond max.
14.	PULSE CHARACTERISTICS:	a. Duration: 0.45 to 0.65 microseconds for RF pulse widths between 0.4 and 0.6 microseconds except for the 4th sync pulse which must be 1.1 ±0.15 μsec wide. b. DC voltage (no signal): +0.5 volts max during the period beginning with the leading edge at the mode 4 trigger and ending 70 microseconds later.
15.	DROOP	1.5 dB maximum over the complete interrogation.


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